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Making a Light Cut with an Elevating Grader in Illinois

See page 54

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It's a Race *between* Pavers *and* Cement Dock

Tandem Pavers Poured 2,000 Feet of 20-Foot Slab Daily on Hanlon & Okes Job at Fairfax, Minnesota

WHEN the pavers running in tandem set a pace of over 2,000 feet of slab in eleven hours, the cement dock and the batching plant have to keep cool as best they can for the batches must keep moving to the pavers. Hanlon & Okes of St. Paul, Minn., completed its 13.5 miles of paving between Lafayette, Winthrop and Gaylord, Minn., last summer in record time and then took on the contract that had been awarded to Anderson & Son between Fairfax and Winthrop, amounting to 21.25 miles. This was just another job to Hanlon & Okes whose tandem paver team was tuned to keep right at 2,000 feet a day. In Minnesota a contractor cannot work more than 48 hours a week under the new labor law so that the 2,000 feet a day may be accomplished for four days a week and then there remains only four hours to pave on the fifth day, that is if there is no trouble in ordering the weather and cancelling all orders for breaks in the machines. One of those unexpected breaks that no one could possibly have planned for occurred this summer. The grizzly on the sand bin was supported with a standard rail from a railroad stockpile. In the early morning when it was piled high with sand the rail snapped and dropped into the bin. This meant that many valuable minutes had to be wasted fishing for the rail and finally running all the sand through the batcher into trucks below and dumping it back on the stockpile. When the rail sections came through, then the crane started to load as fast as the operator could swing, grab, swing, lift and dump.

Spring Water for the Pavers

It was not that the pavers were such pets of the company that they were treated to spring water for mixing the batches but water was a scarce article in the town of Fairfax as the public supply had given out. The contractor was forced to consider pumping 12 miles from a river or to try the suggestion of a local man and sink a well. The chance was taken in advance of the needs of the pavers which were working at another point. A well was driven with a 5-inch casing to a depth of 200 feet. A 20-foot screen was placed in the bottom and the well arranged for air lift. The result was as fine spring water as one could desire and at the rate of 200 gallons per minute. In order to provide a "stockpile" of water, use was made of an excavated area about 150 x 50 feet and 7 feet deep to store water. This had been excavated by a local farmer to provide a pond from which ice could be harvested in the winter as no other source of natural ice was available in the town.

A Chicago-Pneumatic portable compressor was set up alongside the well and used to provide air for the 1¼-inch air pipe which was run inside the 5-inch casing. The water was delivered direct to the pond and

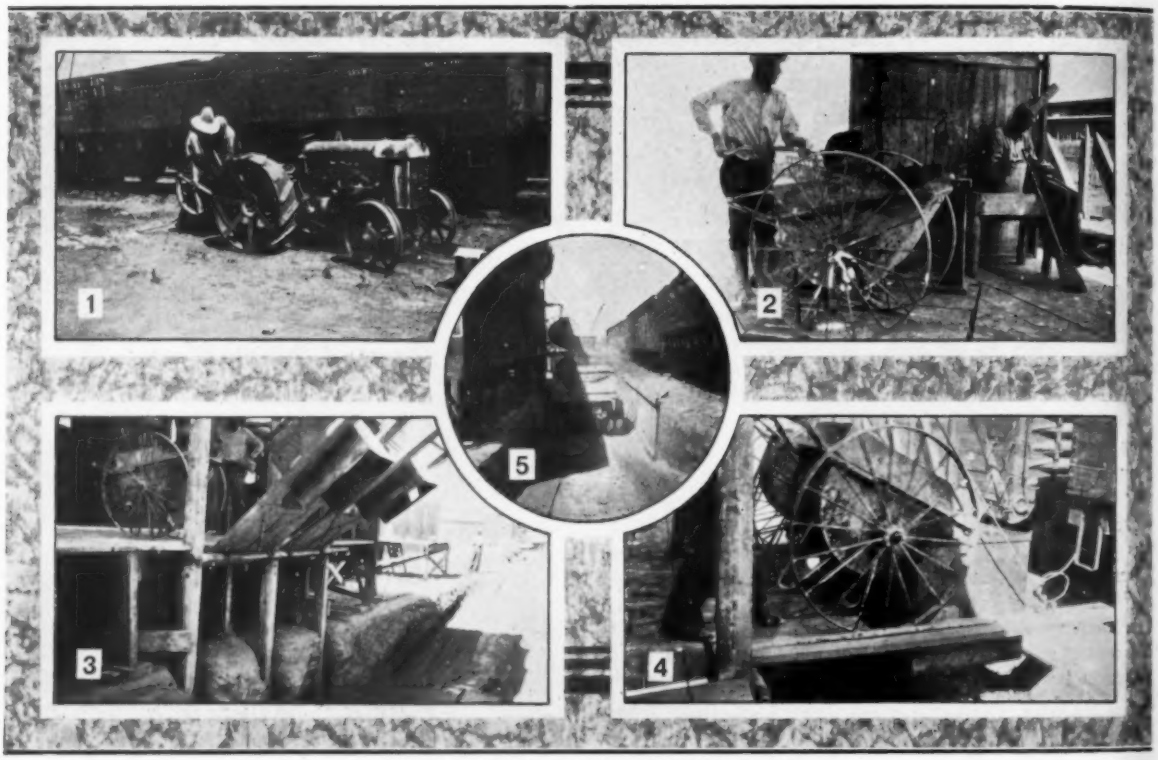
then about 50 feet from the delivery point a C H & E triplex road pump was set up and pumped through 2½-inch pipe to the mixer about 3½ miles away. Taps for the paver were set every 500 feet. The No. 1 paver carried two 2-inch hose each 250 feet long so there was no delay in attaching the hose when the limit of operation of one was reached. The paver also carried a ¾-inch hose 100 feet long for sprinkling the subgrade.

One Crane Handled Both Sand and Gravel

A Johnson bin was set up alongside the railroad track at Fairfax and a single Koehring crane with a 45-foot boom and a 1½-yard Owen bucket unloaded 28 to 35 cars a day and fed the material through the bins to the ever waiting fleet of trucks. There were two men trucks of which thirteen were owned by the contractor and the remainder were hired. The aggregates were supplied by J. Wunder of Minneapolis by rail.

The Cement Dock Built for Speed

The cement dock had two sets of Fairbanks scales which prevented any delay in weighing the carts as they were loading from two cars of cement and coming from two directions. The scales simplified the traffic control of the wheelers and gave a smoothness to the running of the dock. The dock was 80 feet long, sufficient to accommodate two cars of cement at the same time, and it was 6 feet wide for the runs from the doors of the box cars. The scales were set slightly at an angle at the corners of the runs where they widened into a platform 24 feet wide and extending about 15



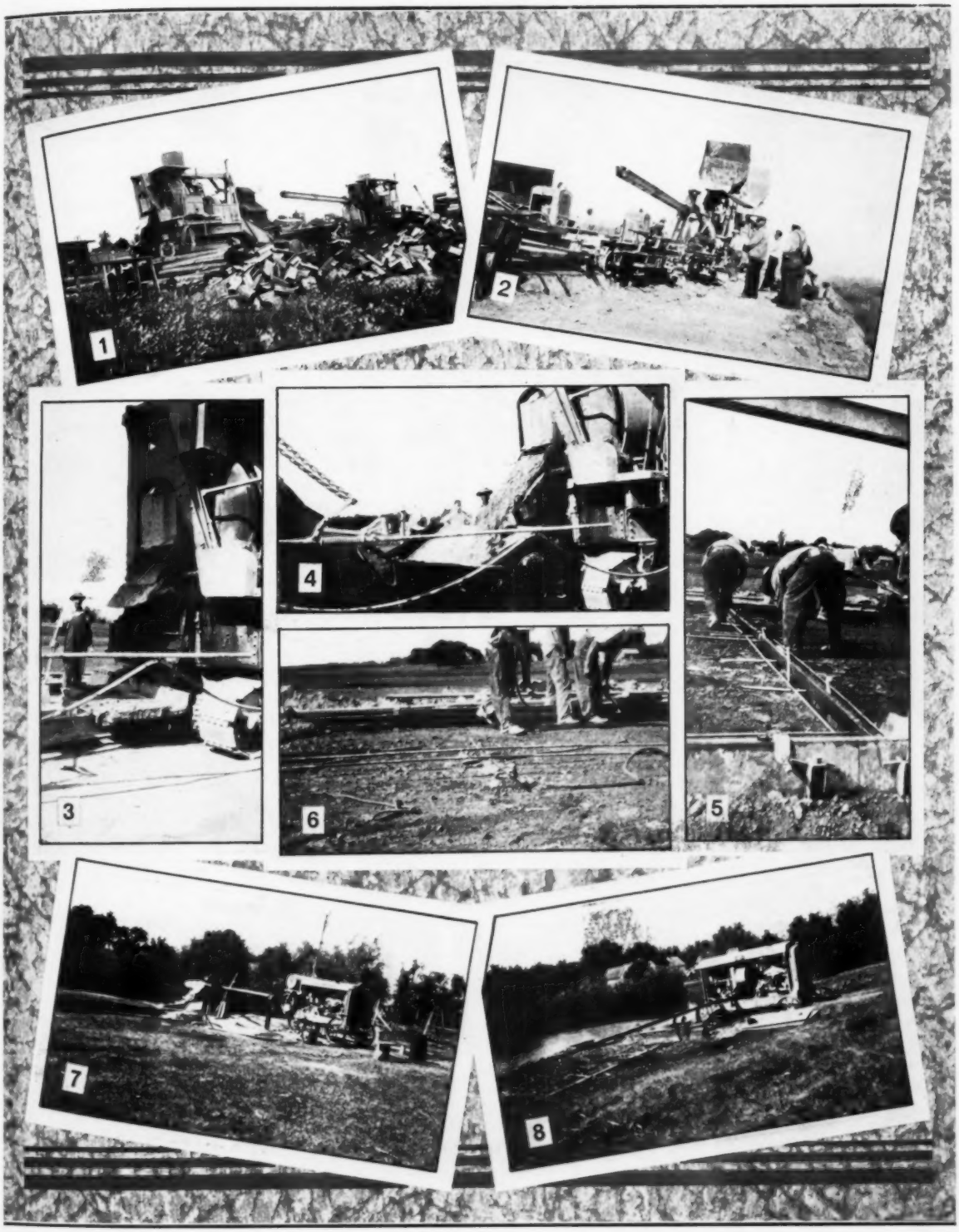
SCENES AROUND THE CEMENT DOCK

1. A Fordson tractor anchored with a dead man and equipped with a stump puller for moving the cars of aggregate. 2. Weighing out the cement on one of the pair of Fairbanks scales. 3. A close-up showing the method of supporting the cement traps. 4. Cement carts entering the traps. This picture shows the pipe guides for the wheels and the stop blocks. 5. A view of the runway to the cement dock showing the metal plates for the truck wheels.

in the cars to pick out such rags and sticks as they could and to spot the bucket and clean up to prevent delays in moving the car. The crane operator was a busy man as was the batcher man who moved the trucks as fast as possible and still weigh each batch accurately. A grizzly of ⅜ x 2-inch strap iron held together by ½-inch rods with pipe spacers to give a 5-inch opening in the stone bin and 3-inch for the sand kept out most of the rags and sticks not caught by the men in the cars. The sand grizzly and the stone grizzly were each built in two parts so that they could be easily picked up by the crane and loaded for moving.

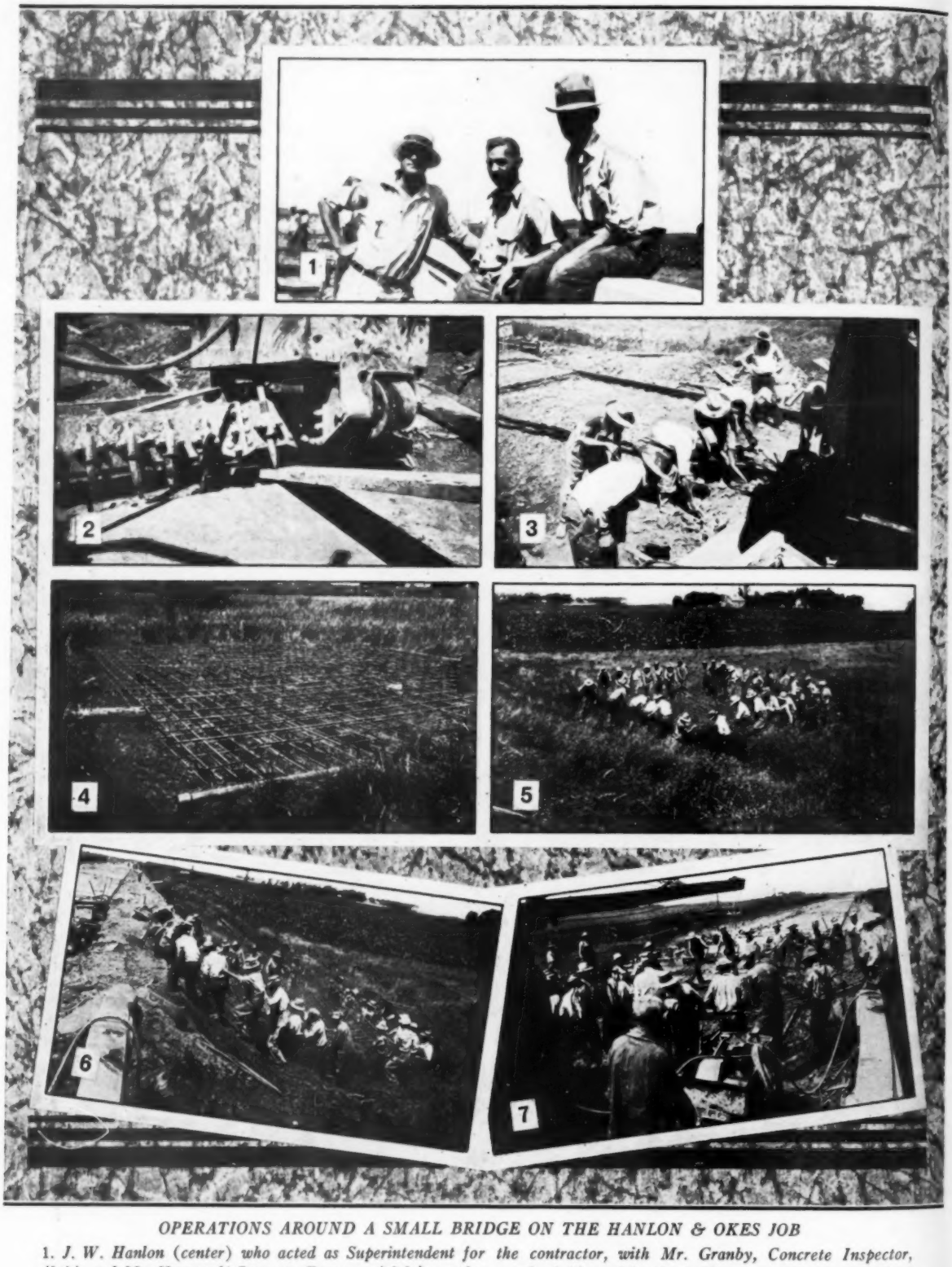
All batch hauling was done by a fleet of twenty-two feet toward the grade.

The dumping traps were made three-sided of galvanized iron mounted on wood platforms which were attached to a long pipe which acted as the hinge for the traps. The small wood platforms onto which the carts ran had small pipes securely nailed to the floors to act as guides for the wheels of the carts. The traps were counterweighted so that they could be readily raised to clear the cabs of the trucks as they drove in and also to prevent the cement being dragged out from the batch. Blocks on the platforms acted as stops so that the carts could not run too far and the platforms themselves acted as buffers against which the lips of the carts were struck to completely empty the cement.



DETAILS OF OPERATIONS ON THE HANLON & OKES 13.5-MILE PAVING JOB NEAR FAIRFAX, MINN.

1. The tandem Koehring pavers on flat cars ready to move to a new section. 2. The two pavers on the job the following day. 3. The chute from No. 1 paver, showing the drip board mounted on the tie bar between the two pavers. 4. Delivering a batch from No. 1 paver into the skip of No. 2. 5. Setting an expansion joint. 6. Center bars with a cross dowel shown supported by a removable chair which was pulled out by a rope. 7. The Chicago-Pneumatic compressor which operated the air lift in the 5-inch driven well. Water is seen just emerging from the delivery pipe. 8. The C H & E No. 11 triplex pump which forced water from the storage pond to the booster station on the road.



OPERATIONS AROUND A SMALL BRIDGE ON THE HANLON & OKES JOB

1. J. W. Hanlon (center) who acted as Superintendent for the contractor, with Mr. Granby, Concrete Inspector, (left) and Mr. Neszaard, Concrete Foreman (right), resting on the bridge while the tandem pavers were moved up onto the bridge slab. 2. Skidding the subgrade planer of No. 2 paver across the bridge slab by imbedding some of the teeth in heavy planks. 3. Trimming up the grade against the bridge slab by hand prior to placing the heavy reinforcing mat. 4. The approach slab reinforcement assembled in a field near the bridge. 5. Not a circus stunt nor a net for a parachute jumper but the entire grading and concreting crews preparing to carry the mat up to the road. 6. Moving the mat up the shoulder. 7. The mat almost ready to drop into place.

The runs for the trucks were laid with steel plates to prevent the trucks cutting into the grade in case it might be a little soft after rains, particularly as the driveway was depressed. At one end of the cement dock was a house for the storage of cement in cloth bags in case of emergency and also for the use of the culvert gang.

The crew operating the cement dock consisted of nine men, with four and three men per car shoveling and wheeling and one man weighing, and one dumping. Lehigh cement was used throughout the contract.

The aggregate cars were pulled by a Fordson tractor anchored with a dead man and equipped with a stump puller to give the maximum pull with the least expenditure for power. It worked very well and quickly, a fact that is very important when thirty cars of aggregate are to be unloaded in a day in addition to several cars of cement.

FINE GRADE KEPT 1,000 FEET AHEAD OF THE PAVERS

When the transportation system of a concrete job becomes so very important, as it does with a batch dumped every 30 seconds, it pays to keep the grade as clear as possible for as far as can be ahead of the pavers. The contractor on this job maintained a well shaped and firmly compacted grade for fully 1,000 feet ahead of the tandem pavers, although during the day when the forms were a little slow in being brought up the pavers usually crept up to within 800 feet of the fine grade and form setting crew.

The grade was trimmed and scarified with a pair of Warco Road Hogs and where it was necessary to bring in some extra dirt or to remove any excess a team with a slip scraper was used. One of the Road Hogs cut the form trench true to line and a crew of only three men was required to trim the grade. One form setter on each side and three helpers for each kept the forms as far ahead of the paver as the amount available would permit. The form setters' helpers trimmed the trench by hand, tamped the forms and realigned as necessary. Nine-inch Metaforms were used for this job. A Buffalo-Springfield steam roller, weighing 8 tons, was kept on the job to roll any soft spots or fills that might be required. As soon as the forms were set and the Road Hogs had cut the grade to approximate contour a Hug subgrader was pulled along the forms by one of the Hogs to trim the subgrade to final shape.

The final men on the grade before the pavers came along were one to oil the forms and another to operate the Freeman double-ended turntable.

SETTING THE PACE WITH THE TANDEM PAVERS

Given a clear field with the grade in perfect shape and no curves nor bridges to cross, a pair of tandem pavers is just ready to show the world what cooperation between machines can do. A man at the skip of No. 1 paver kept the trucks moving as fast as the two batches from each truck was dumped and cleared. The time for charging, mixing and discharging the concrete was about 48 seconds per batch at top production. This allowed about 75 batches per hour. As 2-batch trucks were used, one moved away from the paver about every 96 seconds. Care in spotting the trucks, speed in tripping the batches, and promptness in starting the truck away from the paver so that the next could back in required a man of more than usual alertness on the dumping of the batches.

A Klaxon horn was used by No. 2 paver operator to notify No. 1 operator whenever they were to move so that the move would be synchronized and no trouble experienced with the trucks which might be moving up at that time. Between the two pavers, which were attached by a tie bar, one man was needed to shovel from a drip box into which any grout spilled from No. 1 paver was caught on every batch. This man also assisted the men shoveling from the subgrade planer pulled by No. 2 paver. This Koehring planer cut a smooth and accurate grade. Except for the spilling of a small amount of grout between the two Koehring pavers from each batch they worked as smoothly as could be reasonably expected of two machines originally designed to operate as separate units.

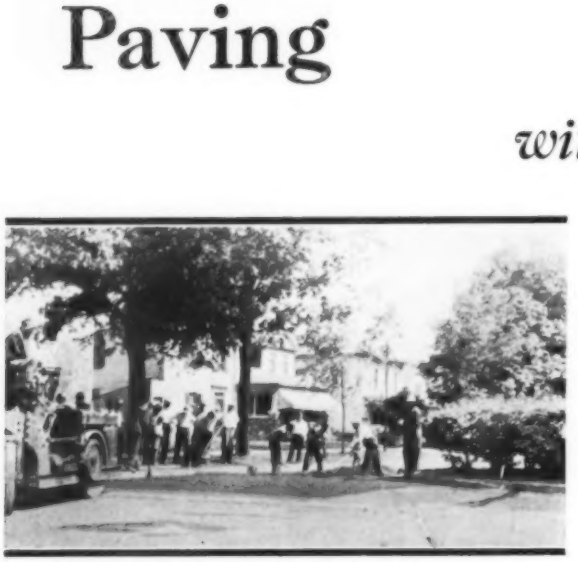
There were two men shoveling from the subgrade planer and a boy who sprinkled the grade behind No. 2 paver. Two steel men and one helper, who oiled the expansion joint caps and made up the contraction joint steel, set the center and side bars and the cross dowels. A poured expansion joint was used, the thin metal form for which was left in the concrete. There were two puddlers and one spader who worked on both sides of the slab. The operator of No. 1 Ord screed kept pace with the pavers and worked over the concrete twice. The No. 2 Ord finisher pulled a trailer which carried the cutter wheel for the center slot. This was worked into the concrete on the second pass of the finisher. The trailer also carried a hand cutter for the transverse dummy contraction joints. This was used by the No. 2 Ord operator and one of the longitudinal float men. The second man on the Iowa 12-foot float which was worked from a tandem rolling bridge, put in the wedges for the dummy contraction joint. One man riding the trailer of No. 2 Ord finisher did nothing but place the T plates in the slot for the continuous center joint.

Two finishers followed the longitudinal float men and used the drag straight-edges, the long-handled floats where necessary and one belt. One man from a separate bridge pulled the center T plates and a helper cleaned and carried forward the plates to the trailer to be used over. The same man also pulled the transverse wedges and edged the joint. Another man edged the pavement.

There were two men spreading the burlap cover from a rolling bridge and two sprinkling. The burlap was spotted along the shoulder as it was brought up and then spread on the bridge before placing on the pavement. There were two men pouring the center slot, the transverse dummy expansion joints and the expansion joints with asphalt. One man of the curing crew helped bank the sides of the pavement slab with earth for curing and sprinkled it while the other with his helper spread the calcium chloride over the slab with a seeder or lime spreader. Two other men helped bank the sides of the slab and assisted in loading the calcium chloride into the spreader. The sacks of Columbia calcium chloride and the asphalt barrels were spotted out on the shoulder well ahead of grading so that the work would not interfere in any way with grading. Two trucks were used for that work, a Ford truck handled the hauling of dowels and such light material while a

(Continued on page 50)

Paving *with* Asphaltic Gravel



Spreading and Rolling the Hot Asphaltic Gravel on a Street in Rochester, Mich.

Claude B. Talbot, Detroit Contractor, Laid 50,000 Square Yards in a Town of 5,000 Population

ASPHALTIC gravel, one of the latest types of paving mixtures used in the program for low-cost roads, was the material employed in an extensive surfacing project recently completed in Rochester, Mich., by Claude B. Talbot, Contractor, of Detroit, Mich. Rochester is a town of about 5,000 population, situated about 26 miles northeast of Detroit and 10 miles east of Pontiac, Mich. Most of its streets were graveled over natural earth base and had become solidly compacted by traffic. The main street had been paved with concrete as it is a State route to north Michigan points. Also one or two State route feeders were paved within the town limits.

Each year the village has spent considerable sums for chloride and other dust laying materials. Having a good gravel producer adjacent to the town and noting the success of the adjoining McComb County with its asphaltic gravel pavements, the Village Council decided to pave most of the main residential streets during the summer of 1931. A contract was awarded to Claude B. Talbot for about 2 miles of paving, but as he progressed the townspeople gradually increased their order to approximately 50,000 square yards and have intimated that they will complete the entire city in 1932.

Advantages of Asphaltic Gravel

McComb County, Mich., was one of the first to try asphaltic gravel, covering a large mileage of county roads with material taken from several of the county-owned gravel pits at a cost of less than $5,000 per mile. Asphaltic gravel consists of bank run mineral aggregate, screened to remove stone over ¾-inch in size, mixed with the proper percentage of bitumen. It can be laid either hot or cold, depending upon the kind of asphaltic oil employed.

This material opens a wider market to sand and gravel producers as well as offering to road and street and highway officials a wearing surface for existing compacted dirt and graveled highways at a very nominal cost. The expense, it is claimed, is about one-quarter of portland cement concrete and one-half that of older asphaltic pavement. A number of states are using this type of mix and others are considering it. Exponents of asphaltic gravel consider it more satisfactory than the "mixed-in-place" methods. It is mixed in the gravel pit, eliminating the haulage of raw material and involves only the transportation of the finished product.

It is claimed that the fresh new gravel gives cleaner aggregate, more evenly divided, assures adequate heat treatment, exact proportioning of asphalt and more uniform mixing. Asphaltic gravel makes a dense, watertight compacted pavement which is essential to prevent breakage under traffic or freezing out in winter. The plan of using old road material, scraped together and mixed in place after spraying with hot or cold road oil, involves the danger of excessively powdered aggregate, and the presence of ingredients undesirable in an asphaltic mix. If treated with hot oil, no assurance of proper heating is certain unless the old material is removed to some central plant as is done with pre-mix material.

The Work in Rochester

The preliminary work in Rochester included grading the streets to remove surplus dirt or gravel, making

provision for drainage at intersections, providing for future curbs so as to allow for a top coat of asphaltic gravel 3 inches thick before compaction and 2½ inches thick after rolling. The streets were opened to traffic a few hours after rolling was completed.

The gravel was obtained from the pit of John G. Kemler, 3 miles from the town. No special processing was necessary. The run-of-bank material was carried by a belt conveyor from the bank to the top of the bins where it passed through screens to exclude stone over ¾-inch size but it was not washed. The gravel contained normal moisture, not over 8 per cent, and was fed directly into the contractor's portable heating and mixing plant. The gravel pit owner's subcontract included hauling the hot mix in steel body dump trucks a distance of 3 miles to Rochester. The bodies were kept oiled to prevent sticking and the loads were covered with canvas en route to retain heat.

The Portable Pre-Mixing Plant

The paving contractor used a Chausse portable asphalt plant for the pre-mixing of the asphaltic gravel. This plant consisted of two units, both mounted on steel wheels with solid rubber tires so that the plant could be readily and quickly moved. On this job the machine was cribbed up because of the high water level in the pit which prevented digging a deeper run-way for loading the trucks. The first unit was the drier. Aggregate from the pit bin was fed directly into a large hopper from which it passed to the rotating sand drier. There the material was thoroughly dried and heated to about 300 degrees Fahrenheit and discharged into an elevator attached to the other unit.

The elevator raised the heated aggregate and discharged it into a self-measuring device and thence into a continuous blade type pug mixer. At the same time, the bitumen which was being heated in the 950-gallon tank, was pumped into a measuring device connected to the aggregate measure. The asphalt measure was adjustable so that any amount of bitumen up to 10 per cent could be admitted into the pug mixer. On this job between 5 and 6 per cent bitumen was used.

From the pug mill, the hot mix dropped into the storage bin which was equipped with a movable bottom gate operated by the truck driver. The plant can also be used in making standard formula asphalt paving mixes, using crushed rock and sand, and for either hot or cold laying. It is equipped with two Hercules engines, oil burners, an American exhaust blower and a small Worthington air compressor.

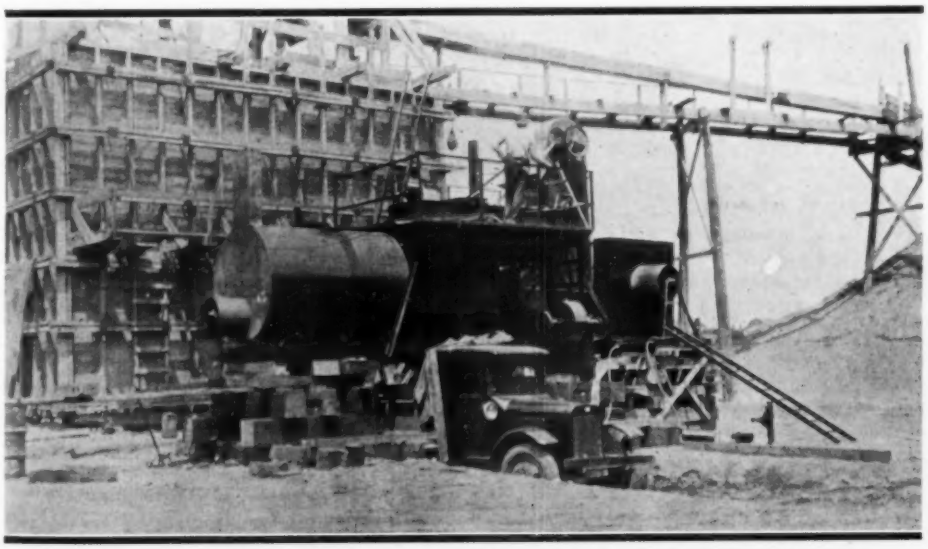
Labor Organization

The general contractor handled all of the work with the exception of hauling the hot mix. He employed thirteen men for the job, consisting of one foreman, two plant operators, four shovelers and rakers on the road, one man setting forms, one roller operator, one driver with a tank truck to carry asphalt from the tank car to the plant, one fireman for the tank car heater and two watchmen. In addition, the subcontractor employed three or four men driving the trucks and usually two men in the gravel pit.

Costs

The total operating cost was about $4.00 per ton for the asphaltic gravel completely laid and rolled. This figure includes all material and labor as well as interest and depreciation on equipment. It further includes with ample margin a cost of roadway complete at about $1,500 per mile per inch of compacted thickness 20 feet wide.

The method of installing the asphalt plant in the gravel pit next to the gravel bins was economical and worked out admirably as the only hauling required was that of the finished product to the points of application. The haul of 3 miles showed practically no loss of heat and it is felt that a haul of 15 to 18 miles would have been entirely feasible. The material was laid at an average temperature of 275 degrees Fahrenheit. About half a day was needed to make the plant ready for hauling to any other location and in about a day it could have been ready for complete operation.



The Chausse Portable Asphalt Plant Set-up in the J. G. Kemler Gravel Pit Near Rochester, Mich.

A Batch Truck Today—

A School Bus Next Winter

Paving *by* Subcontract *and* Some Interesting Details

WITH all the hauling of batches done by individual truck owners at a specified rate per batch, and with four subcontractors doing the paving, grading, building culverts and structures, and the curing, the Cunningham Construction Co., of Indianapolis, Ind., handled the completion of Project 144 B and C running 16 miles from Wolcott to Monticello, Ind., through the town of Reynolds on State Route 24. This 18-foot pavement of 9-7-9-inch section was started in April, 1931, and completed in October, 1931. The F. A. Clements Co. built the concrete culverts, structures, laid the corrugated iron culvert pipe, and followed up the grading crew with the concrete headwalls on the pipe. The rough grading was done by the Roy Fatout Construction Co., Indianapolis, and the fine grading and paving by the McAfee Construction Co., of Bluffton, Ind., with Tom Daoust, of Stanton, Mich., handling the curing by the ponding method under another subcontract. Perhaps the greatest interest centered about the paver where there were several items particularly interesting and rather unusual in paving which might well be adopted by contractors in general.

Having experienced a great deal of trouble with the heat during the summer, particularly in the handling of the concrete by the puddlers, the contractor on concrete devised an awning of burlap which covered the entire grade from the paver back to the finishing machine when that piece of equipment was as far forward as it could run up to the puddlers. The lower end of the awning was affixed to a pole about 20 feet long which rested on the end of the paver boom. Heavy wires were run to the top of the paver to support the awning, and the swinging of the boom was not interfered with in any manner as the pole at the end turned slightly to equalize the pull from the various wires. This awning or tent proved a great boon to the workmen as they were able to keep out of the glare of the sun during their work. Those who were just outside of the covered area benefited also as they rested frequently under it when work was slack. It is a wonder that other contractors have not thought of this method of protecting the steel men and puddlers, particularly during the hottest weather. The awning was high enough above the heads of the men to give plenty of air and also so that the paver operator could see well ahead and not be held up by having to stoop. Approaching the paver was like walking toward a circus tent with people busily walking in and out of the "tent," but one quickly understood the reason for the "big top" when he reached the scene of activity where there was no shade to be had on either side of the road and for a half mile in either direction on the grade.

Where does the paver hose wear out first? Needless to say the answer is, "In the length next the paver." There is where the hose is moved the most and consequently where it is bound to show the first signs of breaking. The McAfee Construction Co., had a novel and simple method of taking care that this wear was practically done away with. It is worth the attention of every paving contractor. A steel sleeve with slightly flared ends and just a little larger than the outside diameter of the hose and about 15 inches long was firmly attached to the top of the subgrade planer which was pulled by the paver. The hose was slipped through it and a little slack left between the paver and the sleeve. Thus the hose was lifted off the ground at the point of most continuous wear and the chances of its being pulled so as to loosen the coupling at the paver were done away with. A nice little arrangement, cheap, and very good hose and operation insurance!

Batching the Aggregates

Crushed gravel and sand were received in gondola cars from the Logansport pit of the American Aggregate Co. and spotted on a siding at the batcher plant

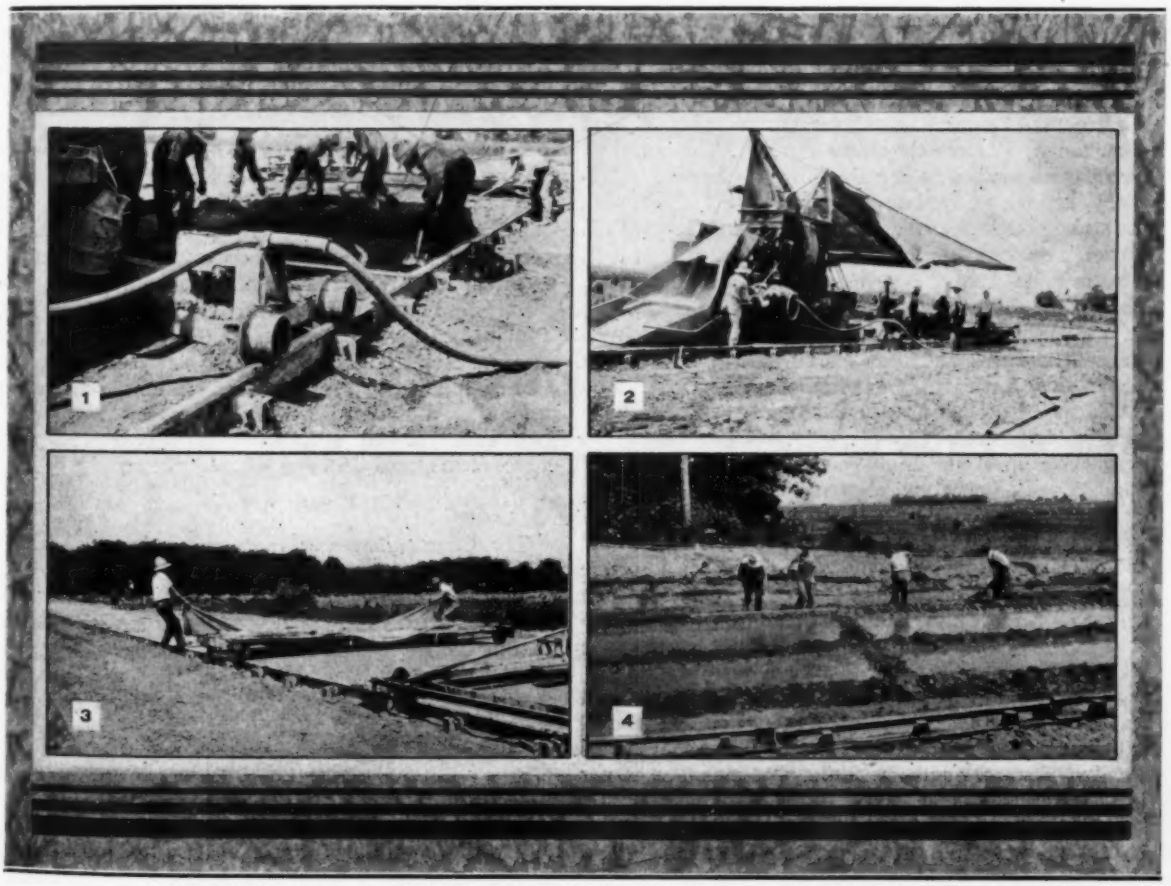
Cunningham Construction Co., Indianapolis, General Contractor
Roy Fatout Construction Co., Indianapolis, Grading Subcontractor
F. A. Clements Co., Indianapolis, Culvert Subcontractor
McAfee Construction Co., Bluffton, Ind., Subcontractor on Paving
Tom Daoust, Stanton, Mich., Subcontractor on Curing

location. There were four batching plant set-ups, Wolcott, Seafield, Reynolds and Monticello. An average of twelve cars of aggregates was unloaded a day and put into the slab. A Koehring crane with a 40-foot boom and a 1-yard Blaw-Knox clamshell bucket handled the unloading to the Johnson wood bins and circular batchers. The aggregate crew consisted of two men in the cars, the crane man and one batch man. The batches were weighed out in the following proportions: 2,165 pounds of gravel and 1,225 pounds of sand for a 7-bag batch.

The one-batch trucks with dual pneumatic rear tires backed under the batchers and received the sand and gravel and then drove about ⅛ mile to the cement platform where three men tossed on the seven bags of Lone Star or Marquette cement for the batch. A cement house was maintained for emergency use and a stock of bags held there. The cement was usually unloaded direct from the cars to the trucks. In the yard adjacent to the cement platform was the trough for dipping the marginal bars. This work was handled by two men who cleaned the bars and then dipped them in the bituminous compound to prevent adherence of the concrete to the steel. Completing the hauling and batching crew was one man on the grade who checked the trucks and gave them tickets showing that they had delivered the batches. The fleet of trucks reached a maximum of twenty-four.

Fine Grade Easy—Rough Grade to 0.2 Foot

The soil in which the slab was laid was a sandy loam with some stretches where the loam was absent and the



SUBCONTRACTORS AT WORK ON PROJECTS 144B AND C, INDIANA ROUTE 24

1. An effective way of prolonging the life of the hose at the paver. In the background are shown the puddlers at work and the setting of the center steel. 2. Viewed from a distance, this burlap awning which protected the puddlers from the sun looked like a circus tent. 3. Spreading the burlap from the wide rolling bridge. 4. Part of Tom Daoust's crew strengthening the ponding dams.

sand rather hard to pull through even for medium heavy cars—based on personal experience—so that the trucks used the old location of the road as long as possible, even though it meant a somewhat longer haul without extra compensation. One truck on this job caught my eye because of its length for the small end-dump batch body. The owner had secured the contract for the hauling of the local school children to the central school for the coming winter and had purchased a long wheelbase Ford truck. But, seeing no reason for not picking up some extra money during the summer, he refrained from mounting the bus body on it and in place put a one-batch body leaving several feet of clear space behind the driver's seat and the front of the body. It worked and it earned, so credit is due the owner.

The amount of fine grading necessary on this contract was remarkably small because of the excellent rough grading in which the work was held to within 0.2 foot of the final grade. The paving subcontractor, who also handled the fine grading, used a Caterpillar Thirty with an Adams blade grader and a 7-foot blade to cut the fine grade. A 1¼-yard Adams rotary scraper was used to remove the excess dirt where the grade was higher than the average. The grader cut the form trench and then a crew of five men handled the trimming of the trench and setting the 9-inch Blaw-Knox steel forms. A Hug subgrader cut the grade to final section and four men shoveled out the excess dirt. The grade was compacted with a 5-ton Austin Pup roller leaving a firm grade even in the sandy sections.

A Ford truck was used to bring up the forms from the rear and to carry out the steel and marginal bars from the yard where they were dipped . The marginal bars were strung out along the forms ahead of the paving. They were placed on the stake pockets which, with the stakes, made a very good rest for them, keeping the asphaltic surface from picking up a great deal of dirt. Two men lined up the forms just ahead of the paver, a procedure that was very essential because of the sandy nature of the grade. The trucks turned through gaps left in the forms and then backed to the paver skip. They stopped about 500 feet from the paver where two men emptied the bags of cement and another baled the bags as they were emptied.

At the skip of the MultiFoote 27-E paver one man dumped the batches and cleaned the bodies as needed. The paver pulled a Carr subgrade planer and two men cleaned out the accumulated dirt. These same men set the marginal bars on the steel chairs 6 inches from the forms and 6 inches from the bottom of the slab. The subgrade planer also had a scratch template which showed up any high spots that might have escaped the planer. Ahead of the paver there was one man cleaning the forms and oiling them. He also came back and sprinkled the grade whenever the paver moved ahead.

One man behind the paver set the Kahlman center steel in 10-foot lengths with four 14-inch stakes per length and transverse dowels ½-inch by 4 feet and spaced 5 feet apart. A spacer made of pipe with clips at the end was used to properly space the center steel when set close to the paver.

FINISHING

Two puddlers handled all the shoveling and the spading. The operators of the Ord finishing machine watched the concrete against the strike-off on one side and the puddlers on the other. There were two finishers who used a long-handled 10-foot float first and then the 10-foot Lakewood aluminum checking straight-edges. Following this the Lakewood hand-operated belter running on the forms was used, run by the two burlap men. The edging of the slab was done by the finishers after the belting. The burlap was brought forward by two teams and a pair of helpers who also did odd hauling during the day. The burlap was spread from a rolling bridge and immediately sprinkled.

PONDING METHOD OF CURING

The curing of the slab was done by ponding the entire area of concrete. This was done by subcontract by a crew of eight experienced men. Dikes or dams were first thrown up along the edges of the pavement even before the contractor's two men pulled the forms. On the superelevated curves another dike was run down the center of the slab and the entire area flooded to a depth of 2 inches. Following this cross dikes were thrown up at intervals of about 20 feet, or closer together if the slab was on a grade. The ponding was continued for a period of 10 days.

The night watchman who came on as soon as the regular crew stopped work for the day did the final edging along the slab so that the finishers would not have to remain for longer periods than the rest of the men. He also spread the last of the burlap and pulled stakes until dark.

A PAIR OF TRIPLEX PUMPS

Two Barnes triplex pumps were used to supply water for the paver, sprinkling and ponding. These were moved along the grade as frequently as possible to give one ahead and one behind the paver. The location of the available streams for supply regulated the times of moving. Both 2½ and 2-inch pipe were used for the supply line along the shoulder, the smaller pipe being used at the end nearer the paver. The taps for the paver hose were cut in at intervals of 216 feet and the paver carried 150 feet of 1½-inch hose. As mentioned at the beginning of this article the paver hose was protected from excessive wear at the paver by carrying it through a sleeve mounted on the subgrade planer.

SHOULDERS

The Cunningham Construction Co. built the shoulders and completed with 18-inch stone shoulders on each side of the 18-foot pavements. An Insley shoulder machine was used in the final dressing, the same machine cutting the 18 x 6-inch triangular groove along the pavement for the metal shoulder.

PERSONNEL

The group of contractors who handled this work by contract and subcontract worked an 11 to 12-hour paver day and regularly produced 1,150 to 1,272 feet of 18-foot slab. Considerable delay was experienced in May and June with very heavy rains which put almost every Indiana contractor behind schedule. The general contractor was the Cunningham Construction Co., of Indianapolis, Ind., for which L. D. Davis was General Superintendent, and H. C. Gingrich was Plant Fore-

(*Continued on page 56*)

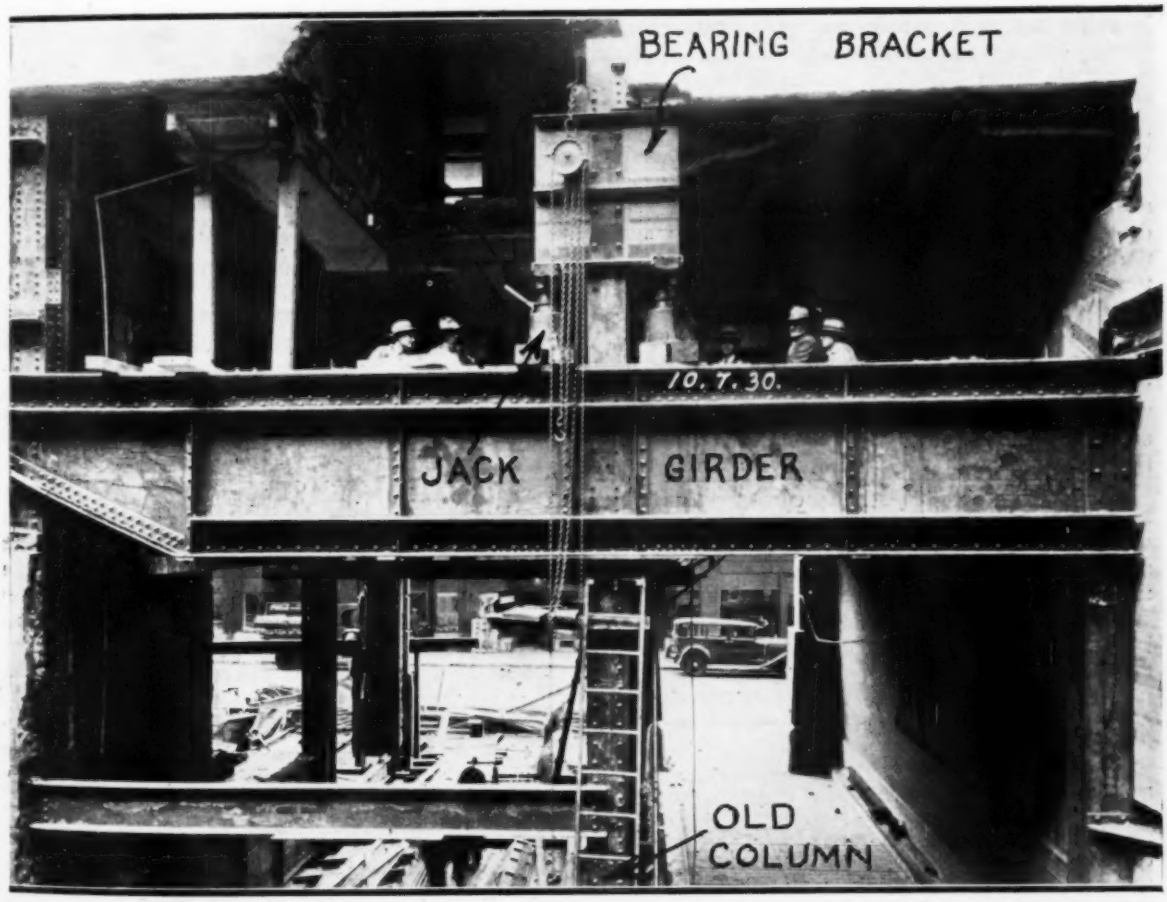
Removing *the* Lower Part *of a* Steel Column *in a* 14-Story Building

By

Frank P. McKibben

Consulting Engineer
Black Gap, Pa.

AT the du Pont Company's fourteen-story office building in Wilmington, Del., it became necessary to widen an existing driveway leading from a street to an interior open court. This building covers an entire city block except for the open court; and it affords space for the du Pont Company's main offices, a theatre, a hotel and other commercial activi-



ALTERATIONS AT THE DU PONT CO.'S OFFICE BUILDING, WILMINGTON, DELAWARE

Removal of the lower portion of the old column required the use of a new girder, to which the old column's load of 460,000 pounds was transferred by hydraulic jacks. The column was then welded to the girder and the lower part of the column removed with an oxyacetylene torch.

ties. In order to widen the driveway it was necessary to remove from one of the main steel supporting columns that part extending from the driveway or ground level to the first floor. As this column supported thirteen floors, partitions and walls, as well as the roof, some means of giving proper support for the upper part of the column must needs be found. Because of the many offices bordering the open court where noise would have been particularly objectionable, welding instead of riveting was used. When the lower section was removed and a new support inserted for the remainder of the column, no settlement of the structure was permitted, as settlement would have resulted in cracked floors, walls and partitions.

The problem was solved by inserting into the existing structure a double plate girder with two webs in such a manner that the one web was placed on either side of the column, with one end of the girder supported by a new column while the other end was attached to an old column. The girder was welded to these two supporting columns. Some short steel I-beams to serve as bearing brackets for the hydraulic jacks were then welded to the old main column a few feet above the girder. At this stage although the girder webs were close to and on either side of the old main column, no connection existed between them.

The next step lay in placing two 100-ton hydraulic jacks on top of the girder and underneath the two bearing brackets so that as pressure was applied to the jacks they pushed downward on the girder and upward on the main column. This pressure was increased till the total downward movement of the girder reached ¼ inch at which time the pressure upon it amounted to approximately 460,000 pounds, equal to the weight of the floors, walls, partitions, roof, in fact, the entire dead load which the column supported and brought to the girder. In this manner the load was removed from that part of the main column which extended from the girder to the driveway floor level, and transferred to the girder.

Then the column was welded to the girder webs with the electric arc, after which the lower section of the column was removed by cutting it off with an oxy-acetylene torch just below the girder and also just above the driveway level. The driveway was then clear; the column was removed; no subsidence occurred in the building and welding eliminated much noise.

The du Pont Company Engineering Department designed and Belmont Iron Works fabricated and erected the steel which was field-welded by Mellon Taylor Hendrickson, Inc. Carson & Carson and Frank P. McKibben were consulting engineers for the welding.

Projected 1932 Highway Expenditures

THE estimate of expenditures for State Highway construction in 1932 together with the expected increased Federal Aid and emergency fund will amount to approximately the same amount as has been expended during 1931, according to a report of the American Road Builders Association. The following table is made up from information received from all but four of the State Highway Commissions and may be considered as authentic. In the four states marked with a star, those not sending estimated expenditures, the figure used for 1932 is the same as 1931. These figures will undoubtedly be increased, as estimates during the past few years have always shown that the actual amount spent is somewhat in excess of the amount estimated for the year. Nine states have increased gas tax rates during the past year, which means additional income for use in the highway program. Information received by the American Road Builders' Association from 128 cities indicates that there also will be some increase in municipal expenditures for 1932.

COMPARISON OF ESTIMATES OF STATE HIGHWAY EXPENDITURES FOR 1931 AND 1932

State	1931	1932
Alabama	$9,695,000	$9,695,000*
Arizona	7,950,000	4,642,000
Arkansas	18,000,000	18,000,000*
California	34,000,000	34,000,000
Colorado	9,797,000	6,050,000
Connecticut	15,125,000	15,300,000
Delaware	2,410,000	2,050,000
Florida	12,000,000	12,000,000*
Georgia	18,000,000	19,200,000
Idaho	6,540,000	5,150,000
Illinois	50,500,000	42,000,000
Indiana	25,000,000	19,900,000
Iowa	27,600,000	35,600,000
Kansas	14,300,000	10,500,000
Kentucky	25,000,000	17,750,000
Louisiana	64,700,000	30,000,000
Maine	15,115,000	14,000,000
Maryland	13,815,000	12,750,000
Massachusetts	25,000,000	17,000,000
Michigan	35,690,000	59,250,000
Minnesota	30,500,000	21,500,000
Mississippi	6,100,000	2,500,000
Missouri	41,354,000	31,905,000
Montana	7,000,000	6,300,000
Nebraska	13,000,000	9,500,000
Nevada	3,000,000	2,550,000
New Hampshire	5,500,000	6,000,000
New Jersey	40,500,000	41,500,000
New Mexico	6,000,000	4,500,000
New York	60,000,000	57,000,000
North Carolina	11,000,000	13,500,000
North Dakota	5,000,000	4,120,000
Ohio	34,000,000	27,000,000
Oklahoma	16,000,000	16,500,000
Oregon	10,500,000	7,500,000
Pennsylvania	60,000,000	60,000,000
Rhode Island	4,300,000	4,000,000
South Carolina	20,700,000	22,000,000
South Dakota	6,500,000	5,500,000
Tennessee	12,000,000	12,000,000*
Texas	45,200,000	47,000,000
Utah	5,000,000	9,000,000
Vermont	5,100,000	4,359,000
Virginia	21,000,000	19,000,000
Washington	14,400,000	12,750,000
West Virginia	20,800,000	9,820,000
Wisconsin	25,000,000	37,000,000
Wyoming	5,180,000	4,950,000
Total	$963,871,000	$884,091,000

It's a Race Between Pavers and Cement Dock

(*Continued from page 43*)

larger truck hauled the asphalt and chloride.

One man handled the pulling of the forms on both sides of the slab and a Ford truck driver and two helpers loaded and hauled the forms, burlap and everything else that has to be moved forward or backward on a paving job.

Placing the Lip Curb

To prevent washing on grades and on superelevated curves Minnesota places lip curb on both sides of grades and on the inside of superelevated curves. This is a plan that can very well be copied by many other states to their advantage. It greatly assists in the maintenance of the shoulders at these very important points. When the contractor was placing 4-inch lip curb he used four men on a side and the same for the second side when the curb was being placed double. For placing 2-inch lip curb the same size crew was used as the work is about the same even though the amount of material is somwhat less.

Personnel

This tandem paving job was handled in an expeditious manner by Hanlon & Okes of St. Paul, Minn., with J. W. Hanlon in charge of the work as Superintendent. The work was in charge of F. E. Miller as Resident Engineer for the Minnesota Department of Highways.

Building Modern Roads *through an* Old Oil Country

Keeley Construction Co. of Clarksburg, W. Va. Laid 8.45 Miles of Reinforced Concrete Pavement Along the East Bank of the Ohio River

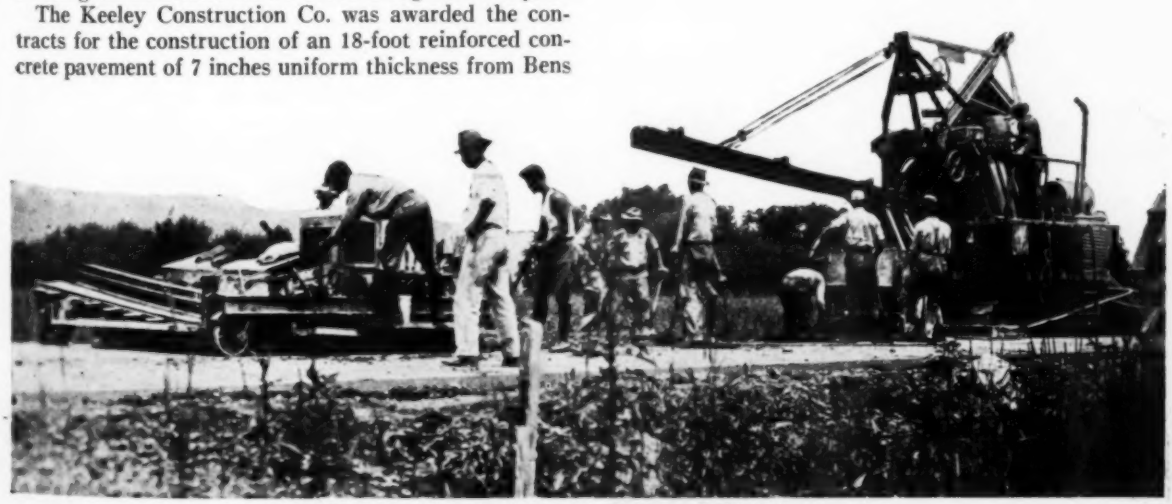
RELOCATION of the right of way of State Route 2 running north from Parkersburg to Wheeling, W. Va., has placed it above a 40-foot stage of the Ohio River, thus gaining an advantage over the route on the Ohio side of the river which is flooded at much lower stages. Without doubt West Virginia possesses some of the most attractive natural scenery of any state in the Union. Whether one enters the state from the south near its capitol, or at the north and east glorious panoramas meet the eye at every turn of the road, and there are plenty of turns. A program of construction that is doing away with the unnecessary curves and is flattening the grades is opening this wonder state to the tourist. Within a very few years the State Chamber of Commerce, if there is one, can boast proudly of the beauties of the State and their accessibility. Then the layman will begin to appreciate the pleasure that the Editor has had these last two years in covering a score of new projects as they were being built. It has meant some hard driving because new grades are not always easily reached but they have been interesting, have offered much in the way of new ideas to pass on to our readers and we have enjoyed the magnificent views as we drove along between jobs.

The Keeley Construction Co. was awarded the contracts for the construction of an 18-foot reinforced concrete pavement of 7 inches uniform thickness from Bens Run through Friendly to Sistersville, all on the Ohio River. These were officially known as Projects 183 A and 103 A and B. They total 8.45 miles in length. The reason for the breaking up of the comparatively short distance into three projects is that they were originally graveled in short stretches and the identity of these sections is maintained in the final paving projects.

The Rough Grading

The contractor moved in early in September, 1930, at the lower or Bens Run end, starting with a fill which was made mostly from borrow. At the very start there was something unusual about this job in that it cut across the corner of a cemetery, requiring the removal of two graves. The largest cut in the three projects was near Sistersville where about 40,000 yards of rock was removed in a stretch 600 feet long and a maximum depth of 30 feet. A 9 x 8-inch Ingersoll-Rand portable compressor provided air for the I-R jackhammers, which drilled with maximum 20-foot steel. The cut was taken out in two lifts and was the only rock cut.

The rock was shot with du Pont 40 per cent dynamite which shattered the sandy shale limestone ledge



The Concreting and Finishing Organization Behind the Paver

very well, making blockholing unnecessary.

The rock and earth handling equipment used consisted of three Bucyrus-Erie steam shovels, all ⅞-yard and a fleet of about fifteen hired trucks which were paid by the hour. The average haul for the entire job was between 600 and 800 feet with a maximum of ¾ mile. Two Caterpillar Thirties with bulldozers handled the material on the fills, and a Caterpillar Thirty with a 10-foot blade grader gave the final trim to the grade. A Cletrac 40 with an Adams 10-foot blade grader also worked on the rough grade. There was one laborer on each dump, and at each shovel, a shovelman, a fireman and one pit man. Ditches 2 feet wide and 2 feet deep were cleared in all the cuts.

QUANTITIES

Item	Projects 103 A and B	Projects 183 A
Clearing	12,827 linear feet	25,024 linear feet
Unclassified excavation	37,000 cubic yards	40,000 cubic yards
Dry excavation	1,700 cubic yards	1,500 cubic yards
Wet excavation	300 cubic yards	175 cubic yards
Borrow	35,000 cubic yards	45,000 cubic yards
Overhaul	50,000 sta. yards	75,000 sta. yards
Class A concrete	225 cubic yards	100 cubic yards
Class B concrete	600 cubic yards	400 cubic yards
Reinforcing steel for structures	28,000 pounds	12,000 pounds
8-inch corrugated perforated pipe	200 linear feet	200 linear feet
15-inch reinforced concrete pipe	800 linear feet	1,200 linear feet
18-inch R. C. pipe	75 linear feet	40 linear feet
24-inch R. C. pipe	40 linear feet	75 linear feet
36-inch R. C. pipe	none	40 linear feet
Relaying old R. C. pipe	500 linear feet	500 linear feet
Loose gravel to maintain traffic	1,500 cubic yards	1,500 cubic yards
Concrete pavement	8,000 cubic yards	10,000 cubic yards
Expansion joint, ½-inch	4,000 linear feet	5,000 linear feet
Metal reinforcing fabric	175,000 pounds	225,000 pounds

DRAINAGE STRUCTURES

A culvert gang of about fifteen men, of whom two were carpenters and the remainder hand laborers, handled all the work of excavation, forms and pouring the culverts, except for one large structure which was subbed. The drainage structures were as follows:

Project 183 A	Projects 103 A and B
39 pipe culverts, new and relayed	23 pipe culverts, new and relayed
8 x 10-foot box, 36 feet long	7 x 20-foot box, 54 feet long
6 x 8-foot box, 54 feet long	8 x 10-foot box, 62 feet long
4 x 5-foot box, 58 feet long	3 x 3-foot box, 62 feet long
6 x 5-foot box, 80 feet long	3 x 3-foot box, 72 feet long
12-foot arch by B. & O. R. R.	10 x 8-foot box, 22 feet long
91-inch pipe by B. & O. R. R.	

A slip of unusual interest, amounting to approximately 8,000 cubic yards, occurred in a cut just south of Friendly where there was a flourishing oil field about 28 years ago. A few of the wells are now still operated, but the pool seems to have about run out. There were several wells in the slip and they were tipped at sharp angles. The contractor dug out the slip around the wells and the owners soon had them erected again and ready to pump. For ½ mile north of this slip there was a network of oil lines which were removed by the owners or run through new casings.

THE PREPARATION OF THE AGGREGATES

The Ohio River is the chief source of sand and gravel in this territory, for floating dredges can dig the material, wash and screen it as required almost in one operation without rehandling. The aggregates of proper sizes are then loaded onto barges alongside and towed to the various yards of the producer along the river or to the batching plants of the paving contractors which are invariably located on the banks of the river to take advantage of low water-delivery rates. The Ohio River Sand & Gravel Co., of Parkersburg, W. Va., supplied the aggregates to two set-ups of the batcher plant. The first was 2 miles north of Bens Run and the second 1½ miles north of Friendly. The gravel company delivered the aggregates direct to the bins of the contractor by a floating stiffleg derrick. The weights of materials for this job were: 2,498 pounds of gravel and 1,320 pounds of sand for the 7-bag mix. These were the actual average weights of gravel and sand measured with the allowances for water.

Green Bag cement, produced by the Basic Products Co., Pittsburgh, Pa., was delivered to the site of the batching plant by barge and unloaded by stacking the bags on a narrow gage tramway car running from the barge to the cement loading platform near the batcher. The trucks drove into the plant site, backed under the batchers, pulled out and backed to the cement platform and then pulled out around a hairpin curve to the grade. Three men handled the cement at the loading platform. A fleet of hired 2-batch trucks handled the batches for the contractor. These were mostly International trucks. Three men near the paver handled the cement, one man cutting the bags and the other two emptying the bags on the batches.

FINE GRADE AND FORM SETTING

A gang of thirty-five men worked on the fine grade and form setting. Of these five were engaged in running the grade and setting the 7-inch Blaw-Knox forms. The remainder was hand labor used in removing excess material from the grade and in filling where necessary. A Lakewood subgrader, pulled by a 10-ton Galion gas roller, was used to cut the grade to shape, and the final grade was rolled by a 5-ton Good Roads gas roller. A scratch board was used by the fine grade crew to check the elevation both before and after rolling. At the paver there was a special planer developed by the Superintendent. It consisted of two 6-inch I-beams spaced 3 feet apart, on the front of which was mounted a set of scarifier teeth and on the back a blade to smooth and cut the final grade. This was pulled by the paver and was the final check on the condition of the grade. The contractor ran the paver between the forms, leaving the second strip for traffic.

THE ORGANIZATION THAT PLACED 1,700 FEET OF SLAB PER DAY

The average day's run for this contractor was about 1,700 feet of 9-foot slab 7 inches thick with expansion joints placed every 90 feet. The best day's run was 2,200 feet. Ahead of the MultiFoote 27-E paver two men realigned the forms and reset the forms taken out for the trucks to turn and one man oiled the forms. One man at the paver dumped the trucks. On the paver there was the operator and the oiler, who also spread the concrete in the bucket and pulled out the last discharge with a hoe and handled the water hose when a shift was to be made. The hose was carried on the paver boom when the paver was working on the far side of the road from the water line.

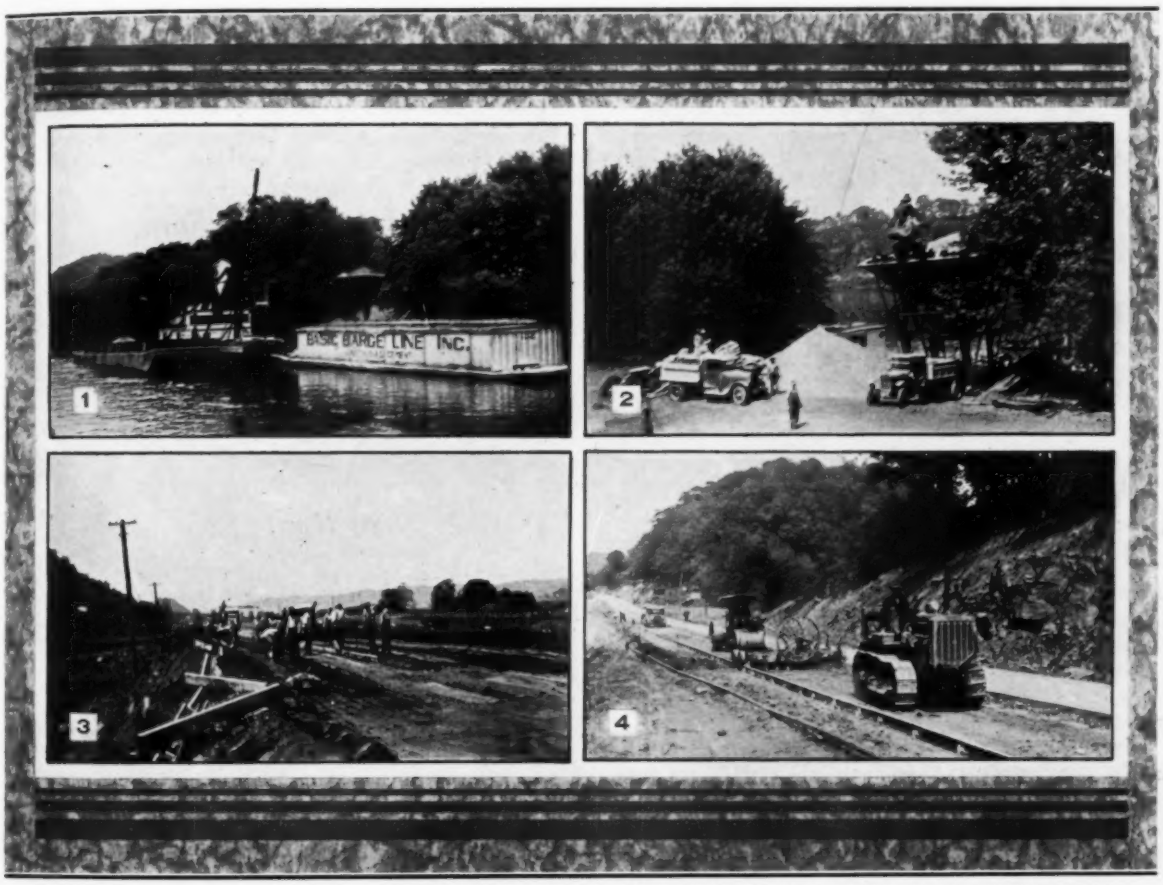
Two men handled the final scratch board at the paver, making such adjustments as were necessary, and four men worked in the concrete, spreading it and striking it off by hand 2 inches below the top of the forms to receive the welded reinforcing fabric made by the Wheeling Steel Co. The material weighed, according to specifications, 45 pounds per 100 square feet.

Two men were used to set the steel and the expansion joints. The finishing was handled by one man and an Ord finisher followed by four hand finishers. Two men straight-edged and used the 10-foot longitudinal float from twin bridges mounted on wheels running on the forms, and pulled the cap of the expansion joint. The other two finishers straight-edged again, belted and edged along the joints and along the forms. Burlap was placed over the finished slab and sprinkled for 24 hours and then the surface was treated with Grasselli silicate of soda. Three men handled the burlap and the silicate. The slab was closed to traffic for 14 days and then opened if the test specimens gave 3,000 pounds when broken. When pouring the second strip, the silicate men kept the first slab clean, removing the fresh concrete, which may have been spilled, by means of brooms and shovels. Usually an extra helper was added for this work. High spots in the slab were removed with a Berg concrete surfacer.

Water for the paver was supplied by a Worthington reciprocating steam pump located on the bank of a creek flowing to the Ohio River. A 2-inch pipe line reduced at the ends to 1½-inch was used along the shoulders with taps for the paver hose at 200-foot intervals. The paver carried about 150 feet of hose.

Concreting was started October 16, 1930, and discontinued for the winter on November 15. Work was started again in the spring on April 17, and completed early in July. Between the first and second strips of concrete no expansion joint was placed. Instead the old strip was oiled just as though it was a steel form. In finishing the second strip the mechanical finisher was equipped with non-flanged wheels to run on the concrete and double-flanged wheels to run on the forms.

The maximum grade on these projects is 3.85 per cent with an average of 1.5 per cent. There are no widened or superelevated curves, and the maximum curve is 2 degrees, 30 minutes.



CEMENT AND AGGREGATES ARRIVED BY BARGE FOR THE NEW 18-FOOT SLAB ABOVE THE 40-FOOT HIGH WATER STAGE ON WEST VIRGINIA ROUTE

1. A derrick boat operated by the Ohio River Sand & Gravel Co. unloading sand and gravel from the river barges into the Blaw-Knox bin located on the shore. 2. The aggregate batching plant at the right, and back of the truck the tractor which pulled the skip car loaded with cement from the barge to the cement platform. 3. Setting the forms. The road was kept open for traffic at all times. The paver hose was carried on a pole to keep it out of the way of traffic. 4. Preparing the final grade with a Caterpillar Thirty pulling a Lakewood subgrader. A Good Roads 3-wheel gas roller was used for compacting the subbase.

PERSONNEL

These projects were constructed by the Keeley Construction Co., of Clarksburg, W. Va., under the direction of William H. Schimmel, General Superintendent, and H. G. Schimmel, Superintendent on Grading. For the State the work was supervised by J. A. Laing, Resident Engineer, with P. O. McGrew as Chief Inspector.

Elevating Grader Prepared the Way for Concrete Road

The Motorized Water Boy

S. J. Groves & Sons of Minneapolis, Minn., and Libertyville, Ill., Paved Nearly Ten Miles of Route 59 North of Plainfield, Ill. in 1931

SEVERAL paving operations of S. J. Groves & Sons in New Jersey have been described in these pages but this is the first contract operating under the home office that it has been our privilege to visit and describe. The eastern work is carried on under the Eastern Division with headquarters at Ridgefield, N. J., while work in the middle west is carried on from the home office in Minneapolis, Minn., or work in Illinois from the branch office at Libertyville, Ill.

During the 1931 construction season this contractor had two jobs not far apart, one in Kendall and Kane Counties, Illinois, on Route 47 and the other, which is described in this article, in Will and DuPage Counties on Route 59, Section 113, north of Plainfield. This work was the standard 9-7-9-inch section, 20 feet wide, with a 1-inch crown. The job was 9.89 miles long and was graded and paved before the other job was started.

Elevating Grader Prepared the Rough Grade

The old location of the road was regraded and the grade cored out with an Austin 36-inch elevating grader pulled by a Caterpillar Sixty. This outfit cast to the shoulders in coring out and when simply cutting the old grade to the new line it loaded a fleet of about six light trucks which could maneuver readily under the belt and which spotted the loads along the shoulder. This outfit was followed up by an Austin 12-foot blade grader pulled by the Sixty which left the grade in practically fine grade condition. There were one or two exceptions where it was necessary to pull in a number of local teams with fresnos to cut the grade when the work was beyond the regular fine grade crew and the paver was creeping up on them.

Two Caterpillar Twenties with a Killefer and a Euclid rotary scraper were used both ahead of and just behind the form setting to handle the ordinary cutting of the high spots and trimming the rough grade to the requirements of the fine grade. These two 1-yard rotary scrapers were very useful and except in the one or two instances when the rough grade was out several inches, they kept all the dirt moving on the fine grade to themselves.

The trench for the forms was cut by a Carr Formgrader and the Truscon 9-inch steel forms were set 1,000 to 1,200 feet ahead of the paver by the two form setters and their two helpers. The helpers trimmed the trench to final line and then helped the setters with the actual lining up of the forms. As soon as any considerable length of the forms were set the Lakewood subgrader was pulled over the forms to cut the grade to its final cross section. A Twenty tractor was used for this work. About six men were required to shovel in the final grading and to shovel out the windrows from the subgrader. The grade was rolled ahead of the paver by a Huber roller to insure a firm foundation for the slab. Ahead

of the roller and constantly moving within the forms was a Warco power grader which was used for leveling the grade after the rotary scrapers had completed cutting any high spots. It also cut the 3-foot trench from the forms in which the thickness of the slab was reduced from 9 to 7 inches.

ALL BATCHING DONE AT COMMERCIAL PIT

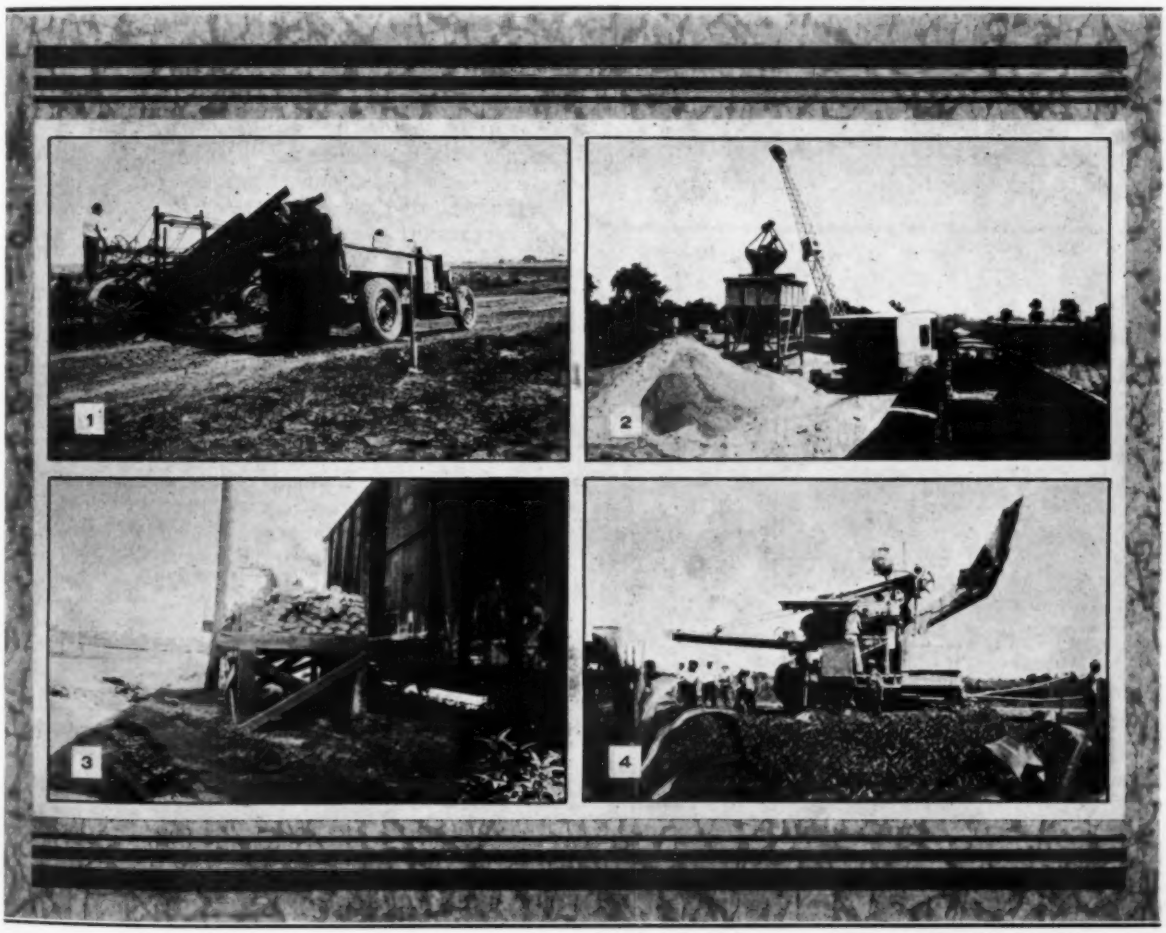
The sand and gravel for the job was furnished by the Chicago Sand & Gravel Co., which operated a pit at Plainfield, Ill., at the south end of the Groves contract. The work at the north end of the job was handled by the same batching outfit set up on a spur and handling the aggregates direct from the cars. The first batching set-up was one mile dead haul from the south end of the job. A Northwest crane unloaded the cars which had been shunted from the washing plant to a siding where the Butler bin with Johnson batchers were located. The crane had a 40-foot boom and used a Williams 1-yard bucket for unloading the gondola cars. There were two men in the gravel and sand cars, a crane operator and the batch man in the plant. The batches used comprised 2,250 pounds of gravel, 1,250 pounds of sand and six bags and 16 pounds of cement. The object in using a split bag of cement was to run the mixer at its maximum capacity, thus increasing production. The crane unloaded about seventeen or eighteen cars a day moving the string along itself as needed.

At the cement cars located at the entrance of the plant and where the trucks stopped for their cement on the way out the cement bags were stacked six high and tossed onto the trucks. The split bags of 16 pounds were put on at a second car. The handling of the six whole bags was done by subcontract and the contractor did the work of splitting the bags under his own supervision. The cement was weighed out on a platform scales outside the car and the cement then put into bags and stacked up on the platform. There were three men working on the full bags and one man on the split bags.

Just before the trucks turned through a space left in the forms they stopped at a small platform from which two men stepped and emptied the bags of cement onto the batch. The platform was located at a maximum of 1,000 feet from the paver. The 3 and 4-batch trucks, all working on the batch rate for hauling, turned about 500 to 800 feet ahead of the paver.

AT THE PAVER

The batches were dumped singly by the dumper at the skip of the Rex 27-E paver. A batch checker at the



GRADING, BATCHING AND PAVING ON SECTION 113, ROUTE 59, NEAR PLAINFIELD, ILL.

1. The Austin 36-inch elevating grader cutting the new grade. 2. The batching plant at the Chicago Sand & Gravel Co. pit at Plainfield, which consisted of a Northwest crane, Butler bin and Johnson batchers. 3. Making up the split bags of 16 pounds of cement. 4. The Rex 27-E paver pouring slab on a low fill.

paver gave the truck drivers a ticket for each load delivered, indicating the number of batches in the load and it was on these tickets that the subcontractor for hauling was paid.

There were two men ahead of the paver lining up the forms and setting the gaps through which the trucks had been turning. These same men also set the string for the form grader. Ahead of the paver the man who oiled the forms laid out the ⅞-inch marginal bars on the grade and set them on the stamped steel chairs that spaced them 6 inches from the form and 6 inches from the grade. The blade of the Carr subgrade planer pushed by the paver was set back at both sides so as not to interfere with the marginal bars. The two men shoveling from the planer cleaned up under the bars so that there would be no undercutting of the slab because of earth against the base of the forms on the inside. The planer was loaded with sand bags to hold it firmly against the forms when the paver moved ahead, making it unnecessary for the crew to ride the planer every time the outfit moved. The two final graders who shoveled from the planer also oiled the marginal bars and sprinkled the grade. A Carr scratch-template was pulled by the paver to give a final check to the grade.

The center steel man inserted the 10-foot lengths of Truscon center strip, drove the four stakes to support it and placed the ½-inch dowels 4 feet long at 5-foot intervals through the center strip. One end of the strip was supported by the previous piece and the other end was held in the proper location with relation to the forms by a spacer made of a long rod with clips at each end to fit the form and also over the strip. At the form the rod had two braces to swing it to a right angle.

The Paver Carried a Subgrade Planer Ahead and a Scratch Template Behind to Double Check the Grade

Two puddlers handled all the concrete and one spader worked on both sides. The operator of the Ord finisher had erected a canopy over a convenient rest on the machine so that he could sit during a part of the time. This was a sort of throne for him as the remainder of the men stood during their working hours.

All finishing was done by two men who first used the 16-foot longitudinal float from a Carr double rolling bridge, then the checking straight-edge, then the 5-foot floats if necessary to take care of low or high spots, and finally the belt and edging. Two men carrying the strips of burlap on a Carr rolling bridge spread the burlap and sprinkled the current day's run. Another man sprinkled the previous day's run and spread the Solvay calcium chloride with a 2-wheeled machine.

Two men pulled the forms and picked up the burlap as the slab was checked in the morning and then in the afternoon were assigned to odd jobs by the foreman. Two men with a truck hauled the forms forward. The checking of the slab was a most important process in this job as it was completed under the new specifications which require that the slab be laid to ⅛-inch tolerance. The contractor was liable to a penalty of one square yard payment for each variation in surface smoothness over ⅛-inch when measured with a 10-foot straight-edge.

Expansion joints were placed every 800 feet and at the PC and PT of curves and the tops of all vertical curves. The joints were 4 inches wide and were poured later with asphalt.

The paver carried an auxiliary water tank in accordance with the Illinois specifications to equalize the pressure of the water running to the measuring tank so that the quantity delivered to the batch would not vary with the pressure in the pipe line. Water for the paver was supplied from several locations during the progress of the work by a Barnes and a Novo triplex pump. The pipe line was 2½ and 2 inches in diameter with taps for the paver hose cut in every 350 feet. The paver carried 200 feet of 1½-inch Goodall hose with an extra 50-foot length on the finisher in case of emergency.

PERSONNEL

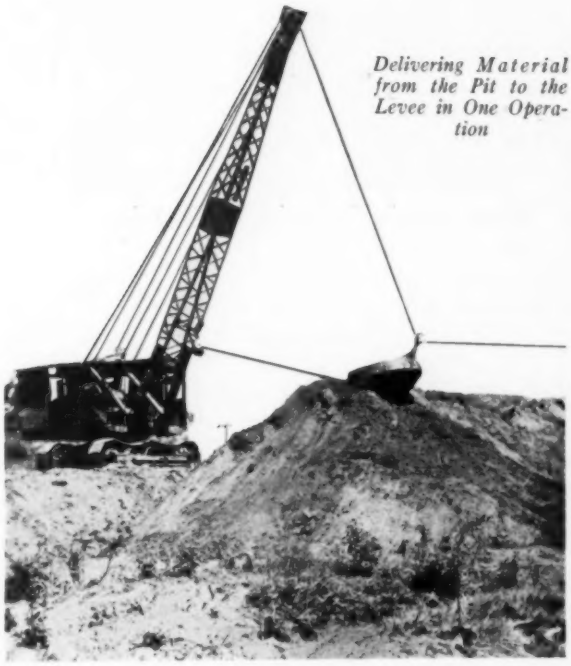
The construction of this project was handled by S. J. Groves & Sons of Minneapolis, Minn., and Libertyville, Ill. Eric Bolander was General Superintendent, with Harold C. Iverson as Foreman in charge of this job. For the Illinois Division of Highways the work was done under the direction of G. H. Wildeson, Resident Engineer and H. R. Baker, Inspector.

Paving by Subcontract and Some Interesting Details

(*Continued from page* 48)

man. The Ray Fatout Construction Co., of Indianapolis, was the subcontractor on the grading and the F. A. Clements Co., also of Indianapolis, built the concrete culverts. The subcontractor on paving was the McAfee Construction Co., of Bluffton, Ind., with Orvil Lantis personally in charge of all paving operations. Tom Daoust of Stanton, Mich., personally led his crew of eight men on the ponding operations and wielded a mighty shovel when a new dam was being thrown up or an old one repaired. B. E. Phelps was Field Engineer for the Indiana State Highway Commission and H. L. Davies, Project Engineer.

Building a Flood Control Levee *with a* Power Drag Scraper



Delivering Material from the Pit to the Levee in One Operation

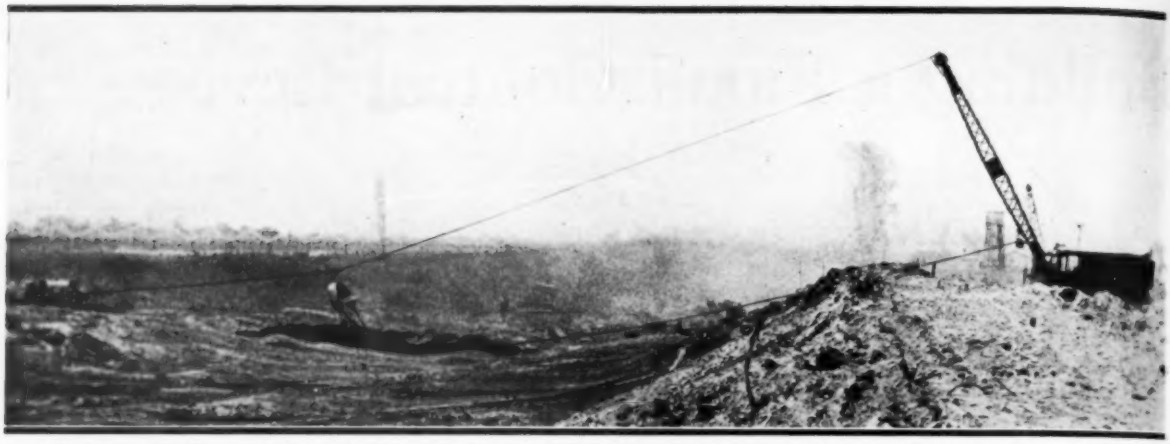
T. G. Smith, South Gate, Calif., Handled Earth Over Maximum Span of 175 Feet from Borrow Pit to Levee

THE construction of a section of flood control levee along the Los Angeles River, Calif., made it necessary to handle earth over a maximum span of 175 feet from the borrow pit to the levee. Contractors working under usual conditions on the same levee were using boom draglines excavating from the borrow pit in one operation and rehandling to the levee in another. T. G. Smith, South Gate, Calif., a contractor on one section, avoided rehandling by using his crawler mounted dragline as a power unit and mobile head tower for a power drag scraper, thus giving the dragline increased operating range sufficient to handle the borrow in a single operation and giving the drag scraper the mobility of the dragline machine. With a track line from the top of the boom to the tail anchorage the scraper worked on the high speed gravity return principle made familiar by the slackline cableway and by the levee building tower along the Mississippi River. The combination of dragline and drag scraper is not strictly new, but its application on a job of this character is a significant development in excavating practice, and points the way to wider usefulness and more economical application of both the dragline or crane and the power drag scraper.

The job on which T. G. Smith was working was a contract with the Los Angeles County Flood Control Department for a section of levee between the City of Los Angeles and Long Beach Harbor. All borrow was obtained from alongside the levee, and no material could be taken from below the summer water level. The contract required the removal of brush, trees and piling from the levee bed and the placing of 111,000 cubic yards of earth within 90 days. In spite of a late start, the progress was sufficiently rapid to assure its completion within the contract period.

Operation of the Dragline

The dragline used was a 1-yard Northwest with a 40-foot boom and a 1½-yard Sauerman Crescent drag scraper. A track cable for the drag scraper operation passed over the top of the boom and out to the other side of the borrow pit to a tractor which furnished a mobile tail anchorage. This track cable was tensioned and slacked off by one of the drums of the dragline engine. The scraper bucket was suspended from a



A Boom Dragline Equipped with a Power Drag Scraper Handling Material Over a 175-foot Span in Building a Levee Along the Los Angeles River

roller carrier riding this track cable. The load cable that pulled the bucket forward passed over a guide sheave on the boom to another drum, lagged so as to give a line speed of 250 feet per minute. In operation, the track cable was slacked off so that the bucket could move over the ground to dig and drag its load forward to the levee, so that the carrier and bucket could return by gravity down the inclined track thus provided. With the 40-foot boom and with the tail block located 225 feet out from the top of the boom, the bucket returned at a speed of 1,500 feet per minute, so that much of the time the bucket made a round trip in about 45 seconds.

Exact control of the scraper's line of operation was provided not only by moving the dragline and, at the other end, the tractor, but also by swinging the dragline boom. The plan of operation on this job was to open a new cut slightly removed from the old cut, leaving a ridge between, then the operator swung the boom back and set the bucket down on this ridge until it was removed. This made it easy to clean up the surface and leave a level and neat borrow pit.

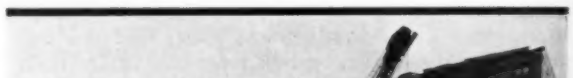
The contractor reports that this method of set-up and operation has been highly practical and has made a good saving in cost, and that he can handle more material over a 175-foot span with the 1½-yard drag scraper than he could over a 50-foot span with the regular 1-yard dragline operation.

Compacting Embankments

THE attitude of engineers and contractors toward placing embankments has been affected by past railroad practices. The flexibility of railroad embankments did not make compaction of prime importance; highway pavements, however, have different requirements, as the same elevation is necessary without filling in the surface. The assumption that the action of the elements and traffic will bring about the complete settlement of an uncompacted enbankment in two or three years is usually incorrect. Artificial compaction methods must be used if settlement is to be obtained quickly.

As the nature of soils varies widely even in small areas, the character of the material to be compacted, as well as the materials on which it is placed, must be known before the engineer can exercise proper judgment as to the best method of compaction. The major source of trouble in embankment construction has been the failure to enforce the specifications as to the thickness of the layer of loose material placed, and the method of compaction required.

Adequate compaction can be obtained with various types of rollers. General standardization of specifications for rollers which will express weights in terms of load per linear inch is needed rather than the gross weight of the roller. Other types of compaction equipment, such as wheel and track type equipment, have been successful for the compaction of embankments of certain types and in certain localities. The proper weight pressures of compaction equipment for different types of soils should be determined. The use of a power-driven mechanical device for spreading the fill material evenly in layers is highly advisable in all cases.



H. H. SHERWIN & CO., NEW YORK CITY, CONTRACTOR, STARTING WORK ON THE CONSTRUCTION OF THE NEW WEST SIDE HIGHWAY BETWEEN 72ND AND 79TH STREETS ON RIVERSIDE DRIVE, NEW YORK

A Northwest crane equipped with a 21-cubic foot extra heavy Hayward Multipower orange peel bucket was used for trimming and handling the rock.

Is Depreciation a Direct Overhead Charge?

By

J. E. Gregory, C. P. A.

Farrington, Hyland & Gregory
Certified Public Accountants
New York City

VERY frequently the accountant is called upon to explain the proper method of handling accounting problems as applied to specific instances. In these cases he is aided by a direct knowledge relating to his particular client's affairs. His answer is usually direct and is generally sound, based upon common sense and understanding. Occasionally he must generalize when he attempts an explanation of the "usual rule".

Typical of the criticisms that follow the statement of any usual rule, the following letter, referring explicitly to the October, 1931, article of this series, indicates a point of view which may be shared by many of the readers of CONTRACTORS AND ENGINEERS MONTHLY. The letter was received from a reader in Albany, N. Y.

"Reading an article in CONTRACTORS AND ENGINEERS MONTHLY of October I find data that may be perfectly all right from a technical viewpoint, but radically out of line from a practical application.

"First, during what year was a truck known to work 300 days? Take 1931, omit the Sundays of which there are 52, the holidays of which there are five major ones, you are left with 308 days, then to assume that any truck will lose only eight days in a year through breakdowns, weather, etc., is stretching the point to breaking. Truck-owners working 300 days per year could retire in a few years. As a matter of fact they are doing well to average 200 days per year.

"Second, your articles are written from an accountant's view of matters with the natural tendency to make work for yourself by complicating matters. Ninety-nine per cent of the contractors start to read your article but never finish, for as soon as they strike 'Reserve' they lose interest, feeling that it is going too far into techniques to be of any value to them. Ninety-nine per cent of contractors are not equipped, nor will they equip themselves, to deal with these matters in the light shown in your articles. In other words to handle their accounting problems in a detailed manner would be entirely too expensive for the results obtained.

"The matter of equipment has always been and probably always will be a bugaboo to the contractor. I venture to say that but few of them regard equipment as a job charge, but merely charge the operating and maintenance, letting depreciation pile up as an overhead item exclusively. Wrong, we will admit, but look at the bids and it is proof that such is the case.

"However, in going into 'Reserve for Depreciation,' 'Reserve for Taxes' and other 'Reserves' you are going in exactly the opposite direction to the street and road contractor who does not want and does not need the complications of 'reserves,' his work is too undecided, the status of work being done too much by estimate for this strict accounting method of reserves, etc. He wants plain facts and figures without any folderols.

"Here are some facts and figures on a shovel that may be of interest, the numbers being rounded to avoid fractions. Let us say to start with that this shovel cost $15,000, for a period of 31½ months the operation and maintenance cost was $5,300, for the same period the depreciation was $8,700, or a total of $14,000. Out of this same identical period of 31½ months the shovel actually worked 400 days. It is charged pro rata per day per job, no reserve, no nothings, that is what it worked and earned during the period, that is what the jobs it worked on must bear.

" 'Overhead' has no place in the contracting game, the source of income is from work done, the expenses are due to the work done, so the work done should carry all the expenses and get away from this imaginary profit by leaving out overhead items on the work costs. The jobs show $50,000 profit for a year, then the contractor wakes up and finds out that the overhead was $60,000, so bluey went the profit, and the 'estimating' and 'bidding' was all wrong. Some accountant is going to hit upon a simple, direct charge to job system for road contractors that will make him the 'white-haired boy.' When?"

This is the eleventh of a series of twelve articles appearing monthly during 1931, *covering tax, accounting and system problems as applicable to the contractor.*

Particular problems relative to either methods of accounting or tax matters may be directed to the offices of Farrington, Hyland & Gregory, Certified Public Accountants, Chrysler Building, New York City, or to CONTRACTORS AND ENGINEERS MONTHLY, 470 *Fourth Avenue, New York City.*

There is no defense to a criticism of this kind, which is of course a jolly indulgence in comics, yet the letter infers a serious desire to be further enlightened.

To the contractor who has never faced Uncle Sam upon a serious income tax problem, the final settlement determination of which rested upon the manner of account keeping, all attempts at explaining accounting theory are radically out of line with practical application.

Uncle Sam is very practical in the methods employed to make his tax collections, proved by the fact that he usually obtains his collection. He is reasonable, however, in his determination of the amount he expects to collect, and bases his entire procedure upon sound accounting theory. In other words, he recognizes accounting theory with all of its so-called technicalities.

The specific illustration used in the October article expounding the difference in accounting application between active time depreciation and idle or waiting time depreciation, was of course a pure exaggeration, to be used merely as a guide in applying generally known and accepted rules to specific instances. It was used merely to explain the rule.

The author of this series of articles would be seriously alarmed if but one per cent of the readers of this magazine claimed sufficient intelligence and common sense to follow through the accounting generalities that he has presented. Most readers will appreciate the fact that accounting is a technical subject, and can hardly be treated without some reference to figures and simulated results.

Because of the fact that accounting for equipment has always been a so-called bugaboo the author has explained a method of accounting that will to great extent, with common sense application, dispel the errors of having omitted its consideration. The fact that bids do not contemplate the subject prove conclusively the ignorance with which they are tendered.

It is hard to believe that the operations of the street and road contractor are so entirely different from general contracting endeavors as to necessitate a dispensing with the creation of adequate reserves that mean so much in the matter of tax saving. To argue from a layman's standpoint would be to say "if Uncle Sam allows them they must have some basis in fact." Uncle Sam does not allow a taxpayer to deduct "folderols."

THE IDLE SHOVEL

The specific shovel problem is interesting. It proves conclusively the necessity for distinguishing between idle time depreciation and active time depreciation. The total depreciation upon this shovel for 31½ months is stated as being $8,700. Assuming that at the end of 400 days the shovel was removed from the job, or that it was available thereafter to other jobs during the period of its idleness, is it fair to charge to this one particular job upon which it was utilized the entire sum of $8,700, the greater portion of which charge could have been applied to other jobs, had the owner been able to provide them? In other words, if a job is completed in June and the shovel is retired to the yard, where it remains in idleness during the remainder of the year, why should the job which was completed in June stand charged with the idle depreciation resulting during the remaining six months of the year?

If a shovel, or any piece of equipment for that matter, must, because of the job, remain upon that job, then and only then should idle waiting time depreciation be charged directly to that job.

ACCOUNTING WILL CARRY ON

The "white-haired boy" who evolved the one-page system of directly charging all expenditures to jobs, arrived years before your author knew there was any such field as accounting.

When overhead ceases to be a factor in estimating, and when Uncle Sam refuses to allow overhead as a deduction in computing income taxes due him, then accountants will gladly hang up their pencils and remove their shingles.

Another Evidence of Interest

IN the June issue of CONTRACTORS AND ENGINEERS MONTHLY the author of this series of articles on accounting, in replying to a tax problem inquiry, developed a hypothetical case pertaining to the possible disallowance of deducting prior year losses resulting from the manner of record keeping, specifically applied to contractors.

A reader calls our attention to an error in the statement of the hypothetical case cited as follows:

"You state that no part of the 1926 loss is deductible in the 1929 return. This is true but is irrelevant, because the entire 1926 loss of $24,000 is deducted from the gain of $50,000 in 1928. A portion of the $50,000 in 1927, $26,000, is applied to the 1928 remaining profit, thus leaving $24,000 of the 1927 loss (but not the 1926 loss) to be applied against 1928. Only the excess of $14,000 over the $10,000 gain for 1929 is lost, not the entire $24,000."

The particular Federal tax rulings pertaining to the deduction treatment for prior year reported losses follow: *Section 117 E of the Revenue Act of* 1928 (e) "Net loss for 1926 or 1927—if for the taxable year 1926 or 1927 a taxpayer sustained a net loss within the provisions of the Revenue Act of 1926, the amount of such net loss shall be allowed as a deduction in computing the net income for the two succeeding taxable years to the same extent and in the same manner as a net loss sustained for one taxable year is, under the Act, allowed as deduction for the two succeeding taxable years."

To prove conclusively the point in contention the author should have carried on to the conclusion of the year 1930 as follows:

Year	Book Figures		Taxable Net Income		Losses and Deficits not Deductible
1926	Loss	$24,000	Loss	$24,000	
1927	"	50,000	"	74,000	
1928	Profit	50,000	"	24,000	
1929	"	10,000	"	14,000	
1930	"	25,000	Profit	25,000	$14,000

As the principal items of loss result from overhead, an early application of overhead to jobs might have saved the entire $14,000 as the allowable tax deduction for 1930.

A Correction

IN the October issue of CONTRACTORS AND ENGINEERS MONTHLY an error was made in the advertisement of the General Excavator Co., which carried the statement, "It can not be a half-yard machine if it is powered with less than a 69-hp. engine. The General is powered with a 62-71-hp. engine when running at moderate speeds." This should have read "60-hp." instead of 69-hp. The manufacturer states that when 60-hp. is used it must be understood that it is more horsepower than any other one-half yard shovel carries.

Experimental Sections *on a* 4.5-Mile Paving Project

Peters Brothers of Toledo, Ohio, Constructed Concrete Highway Near Shores of Lake Erie Between Toledo and Port Clinton

Baling Bags at the Cement Platform

SERVING the playground area between Port Clinton and Toledo as well as the important air field at Camp Perry and the Erie Ordinance Depot, Route 2 north of Lacarne, Ohio, was reconstructed this last summer with 4.478 miles of 20-foot, 9-7-9-inch section concrete paving by Peters Brothers of Toledo, Ohio.

The rough grading was started May 15, 1931, and the entire job completed by September 1, 1931. The rough grading was long strung out as the cuts ran from 1 to 3 feet and included the removal of the old waterbound macadam pavement with a bituminous top, and cleaning up the clay subgrade. There were also sections that had muck subgrades which were not easy to handle. Believing that this stretch of grade offered an opportunity for the study of treatments of various types for the stabilizing of the subgrade the Ohio Department of Highways instituted a series of experiments on this road under the direction of Professor F. H. Eno of the Ohio State University.

The Experimental Work

The experiments included widely different kinds of treatment in 300-foot stretches, giving ample opportunity for the study of the effects of the various methods. There were twelve different experiments undertaken but the results will not be known for a period of years so no comments can be made. The sections were as follows: 1. Crude oil treatment for 300 feet. The base was broken up by scarifying and then 400 gallons of the crude oil applied and harrowed into the subbase. 2. The same treatment with coal tar. 3. Treatment with hydrated lime, 5,000 pounds of which were scarified into the base and harrowed, scarified again, shaped and rolled. 4. Similar treatment with a like amount of portland cement. 5. The next 300-foot section was treated with 93 tons of slag of ½-inch screen size applied to a depth of 4 inches under the concrete pavement and French drains laid throughout the section. 6. The next section was treated in a similar manner except that the slag was of 1-inch screen size. 7. This section was the same as the two previous sections except that the slag was ¾-inch screen size. 8, 9, 10. These three sections were the same as Sections 5, 6, and 7, except that limestone was used instead of slag. 11. Sodium silicate to the amount of 5,333 pounds was applied at the rate of 8 pounds per yard, allowed to stand overnight and then the concrete

Month 1 2 3 4 5 6 7 8 9 10 11 12

Date 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Rate.....

CARD Nº 52

PETERS BROTHERS
CONTRACTORS
729 EWING STREET, TOLEDO, OHIO

Road.....

Owner.....

Truck No.....

Approved Sign.....
FOREMAN

Plant	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
No. Load	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Dump	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o

One of the Cards Used to Check the Batch Trucks

poured the next day. 12. Soda ash in the amount of 6 pounds per square yard was applied in the last 300-foot section. The work that Professor Eno is doing in the study of the conditioning of subgrades is being watched with great interest by state highway departments and highway engineers all over the country. This important work is one which cannot be done in an accelerated manner so the results of any one experiment will not be known for many years. Failures will make themselves known soon so they will be eliminated but the valuable results cannot be distinguished from the neutral results possibly for some time, so infinite patience is required for the maintenance of the work.

The Rough Grade

A Bucyrus-Erie ½-yard steam shovel was used for the stripping work with cuts from 1 to 3 feet in depth and extending for distances of 50 to 200 feet. The shovel loaded to three trucks which hauled as far as one mile but the average was 2,000 feet. A Caterpillar Sixty with a Caterpillar 12-foot grader trimmed the rough grade which was rolled by a Galion 10-ton machine. The Sixty also pulled a 1-yard rotary scraper for the small cuts on the grade. Sections that were to be handled by the scraper were scarified with a Lakewood grade-rooter pulled by the tractor. The rough grade crew consisted of about ten men which included all the operators.

Fine Grade and Form Setting

Two Caterpillar tractors, a Twenty and a Thirty, pulled two rotary scrapers on the fine grade to remove high spots and fill low sections. A Galion power maintainer with a 12-foot blade cut the grade to final shape, and cut the form trench so that there was little hand work needed before the forms were set. All sections whether they had been filled or not were rolled with the Galion 7-ton gas roller. The thickened edge section was cut by the maintainer and then the Heltzel 9-inch steel forms were set with a crew of four form setters and two men hand trimming. A Lakewood subgrader cut the final grade when pulled over the forms by the roller. Then a crew of eight men hand trimmed the grade for the pouring of the slab. One of the fine grade men sprayed the forms, using an insecticide sprayer filled with oil.

Handling the Aggregates

Limestone and sand were the aggregates used for the concrete on this job. The limestone was shipped in from the quarries of the Wagner Co., at Sandusky, Ohio, in gondola cars and unloaded with a 1-yard Williams clamshell bucket operated by a Northwest crane with a 45-foot boom. Lake sand was supplied by the Kelley Island Transportation Co. via Sandusky also in gondola cars and was handled the same as the stone. The aggregates were loaded into the Heltzel bin and measured in the weighing batchers. The operating crew at the unloading and batching plant consisted of two men in the cars, a crane operator, an oiler, and a batch man who worked from 6 A. M. to 2:30 P. M. and a second who started work at 10:30 A. M. and worked eight hours in accordance with the Ohio labor law. There are several states which have similar laws, which, while enacted supposedly in the interests of labor, react very unfavorably on labor employed in highway construction where it is seldom possible for the laborer to work the full 48 hours in one week as he does not have an opportunity to make up the time lost within any one day through breaks at any one of the essential machines which might hold up work.

The weigh man at the batching plant punched the first hole for the batches in the truck driver's card which was the basis of his pay at the end of the hauling period. Then at the paver the dump man punched the card again giving a double check. One of these

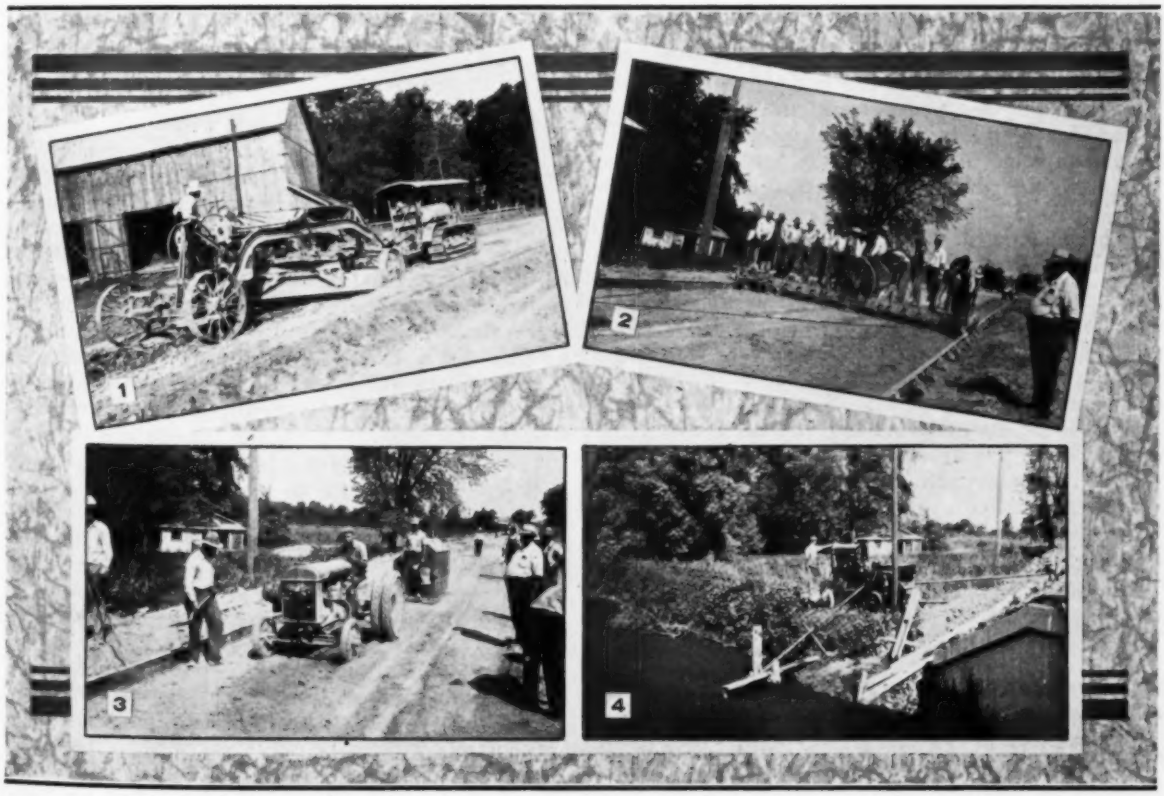
cards, which were used in duplicate so that the punches went through the two cards at the same time, is reproduced through the courtesy of the contractor. A fleet of sixteen 2-batch trucks was used for the maximum haul on this job. The trucks backed in under the batching plant but had plenty of room to turn so that there was little lost time at that point. The trucks drove to the grade where the cement was loaded to the trucks, 7 bags per batch, by four men. The cement was trucked from Castalia, Ohio, from the plant at that point and unloaded from the trucks to the batch trucks or to the platform as expedient. An extra man at the platform baled the bags after shaking them. The platform was kept about ½ to ¾ mile from the paver. The trucks drove to the paver, turning through gaps in the forms left by the setters.

POURING THE 9-7-9-INCH SLAB

As mentioned above, the truck dumper punched the drivers' batch cards after he dumped the batches into the skip of the Smith 27-E paver. The paver pulled a Heltzel subgrade planer from which two men shoveled the excess earth. The Ohio specifications require the setting of one marginal dowel continuously along the forms on each side. The placing of these ¾-inch dowels which were 40 feet long was handled by one of the fine grade crew. The dowels were distributed ahead of the paving by resting them on the stake pockets where they were kept from rolling off by the pins themselves. When placed in the slab these dowels were lapped one foot at either end and the ends of the dowels covered with steel sleeves. At this point also the steel man set six ¾-inch dowels at the mid depth of the slab, each 4 feet long and with steel sleeves over one end. At this point dummy contraction joints were later cut, using a spud 7 inches long and with a 3-foot pipe handle. A steel man set the regular transverse dowels ½-inch deformed, spaced 5 feet apart and 3 inches above the grade.

Three puddlers handled the spreading of the concrete from the paver bucket and one spader worked on one side of the road and the operator of the Lakewood finishing machine spaded the other side. The spader shoveled to the strike-off of the finishing machine when the roll was low. The grade was sprinkled by the steel man at the paver immediately after every move ahead. He used the usual hose attached to the paver but the spray was secured by a flattened piece of copper tubing wired into the hose. It was much more effective in wetting down the grade than the usual "thumb" method whereby the water was liable to spurt almost anywhere.

The finishing machine carried a wheel which was kept in the concrete at all times while working and cut the longitudinal slot for the center joint on both forward and backward passes of the finisher. The slot was 3 inches deep. From a Lakewood bridge behind the finishing machine one man with a pair of



ALONG THE GRADE OF THE PETERS BROS. JOB ON OHIO ROUTE 2 NEAR LACARNE

1. Roughing in the grade with a Caterpillar Sixty leaning wheel grader. 2. The entire fine grade crew "taken for a ride" on the Lakewood subgrader. 3. This utilitarian Fordson handled many odd jobs, among them moving tool boxes on stone boats as shown. 4. This Barnes high pressure road pump supplied water for the paver and for curing.

PAVING AND CURING OPERATIONS ON THE PETERS BROS. JOB

1. *A handy way to keep marginal dowels close to their final position and yet out of the way of the fine grade crew—by placing them on the road form stake pockets.* 2. *The Smith 27-E paver receiving a batch.* 3. *Curing the slab by ponding as seen from the top of a 100-foot windmill tower.*

angle irons to line up the center strip placed the 5-foot strips of premoulded joint material. This man then finished over the strip with a hand float. The finishing machine carried a belt which provided extra finishing.

This pavement was devoid of expansion joints except at bridges and there the bridge contractor was required to put in a wedge-shaped slot 10 inches deep at the edge of the bridge slab, 2 inches wide at the top and tapering to a point at the bottom. In addition to this the paving contractor placed 1-inch expansion joints the full depth of the pavement using premoulded material at distances of 16 feet and 70 feet from the bridges.

One finisher was all that was used on the slab. He used the checking straight-edge and then pulled a length of burlap over the slab with the help of the man working on the center joint. The finisher then edged the slab on both sides. The burlap was placed by two of the men who worked in the ponding crew, which consisted of from twelve to eighteen men. As the slab carried a crown of 1¼ inches and the specifications called for 1 inch of water over the slab at the center, there was usually about 2 to 3 inches of water in the ponds which were used for curing the concrete. The transverse dikes were thrown up about 25 feet apart on flat grade and closer for grades so as to maintain the proper depth of water over the crown. The ponding gang also pulled the forms and loaded them on a stake body truck which hauled them forward over the shoulder to the setters ahead. When the truck could not haul safely a tractor with a stone boat was used to haul the forms.

400-Foot Hose on the Paver

A Barnes triplex road pump supplied the water for the concrete and sprinkling from a sluggish stream. It is evident from the bulletins issued to the resident engineers and inspectors in the various states that specifications or "requirements" run in cycles and what was strictly enforced in June last year has been replaced by a strict watchfulness in another direction this July. Concrete road construction has not yet arrived at the stage of standard specifications generally accepted by any group of states or even within a single state. In one state where a considerable number of working jobs were visited the specifications varied considerably from job to job without any particular reason that could be explained by the resident engineers. The care of the subgrade and its preparation, as in the experiments of Ohio described at the beginning of this article, are not variations in specifications but rather an honest endeavor to find out the best manner to provide a stable subgrade. It is entirely possible that a series of treatments for different types of soils will be worked out as a result of these experiments that will prove very helpful in concrete construction to come.

The water was carried along the shoulder in a 2½-inch pipe with taps for the paver hose set every 400 feet. The same taps were used for the hoses for ponding behind the paver. The paver hose being 400 feet long it was generally arranged to skip alternate taps in the water line. The paver hose was 1½-inch in diameter.

Personnel

This paving project with its experimental work was handled by Peter Brothers of Toledo, Ohio, as a regular contract for state highway construction. The work was under the personal direction of Fred and Robert Peters, partners in the organization. For the Ohio Department of Highways the work was under the direction of Kent Wedekind, Resident Engineer and H. R. Wagner, Chief Inspector.

The Rock Section of a Tunnel and Open Cut Sewer

Horseshoe Section and 72 and 81-inch Concrete Pipe on Various Contracts

CONTRACTS A, B and C are but a small section of the miles of tunnel and open trench work which is under way on the Supplementary Joint Trunk Sewer in Elizabeth, N. J., from plans of Alexander Potter, Consulting Engineer, 50 Church Street, New York City, who is Chief Engineer of the Joint Meeting of the eleven municipalities which have joined together to make possible this utilitarian measure. Contract A, consisting of a twin 5-foot 7-inch x 5-foot 8-inch box sewer in open cut, extends from Sta. 30 to Sta. 55. The next 6,500 feet from Sta. 55 to Sta. 120 is through the streets of Elizabeth and Linden in open cut, laid with 81-inch Lock Joint pipe. The section then crosses the Pennsylvania Railroad main line track where a 100-foot steel liner plate tunnel was driven for the 72-inch Massey concrete pipe which continued to Sta. 131, the end of Contract A. Contract B is part tunnel, extending from Sta. 131 to Sta. 143 with a 72-inch horseshoe type sewer and from Sta. 143 to Sta. 166 is open cut, then again goes into tunnel from Sta. 166 to Sta. 187, which is the end of Section 1. Section 2, part of which is included in Contract B, starts with Sta. 0, is a tunnel in soft ground and rock to Sta. 39 and then open cut to Sta. 47 + 50. This is the end of Contract B and the start of Contract C which is laid with 75-inch concrete pipe through fields to the end at Sta. 184 + 14.

The Allen Street Shaft

This article will be devoted chiefly to the work at the Allen Street shaft on Contract B. This contract was awarded to the Northern States Contracting Co., on November 5, 1930, and work started December 10. Excavation was completed and concreting started on April 10, 1931. This project was entirely a 6-foot horseshoe-shaped tunnel worked from a shaft 40 feet deep and running 740 feet to the north and 411 feet to the south. The contractor worked these headings in two 8-hour shifts from 6 A.M. to 2:30 P.M. and 2:30 P.M. to 11 P.M.

The various utilities necessary for the operation of the headings, including air, light and ventilation, were located as follows, facing the south heading: at the left, toward the top of the tunnel, the vent pipe with the compressed air line just below it and on the right, the 110-volt wires for the lights, which were 50-watt bulbs, located 25 feet apart. Ventilation was effected entirely by blowing because of the short distance from the headings to the shaft. A 0.17 per cent grade in the tunnel made it possible to drain both ways to the shaft where

A Rock Section of the Pennington Street Tunnel Showing the Timbering

approximately 20,000 gallons of water per day was pumped out by a La Bour 4-inch centrifugal pump which discharged into a sewer on the surface.

BLASTING

Two I-R jackhammers were worked in each heading on the red shale which was filled with seams of clay and sand. Each face had two drillers and one runner with two timber men who worked alternately on the two headings. Holes were drilled from 4 to 8 feet deep with no definite drilling diagrams because of the seamy rock. At the time this job was visited, the south heading showed a seam of clay about 10 inches thick at shoulder height. From 7 to 13 holes, depending upon the character of the rock at each shot, were drilled and loaded with Hercules 35 per cent dynamite. Because of the proximity of dwellings, no blasting was permitted after 10 P.M.

The number of clay seams made necessary practically continuous timbering throughout this tunnel. Six x 8-inch posts were used in a 5-piece set with 2 x 8 and 2 x 10-inch packing boards. A total of 35 feet B.M. of timber was used per foot of tunnel, exclusive of the packing boards.

Progress at the Allen Street shaft was at the rate of 12 to 14 feet per heading per day. No blacksmith shop was maintained at this heading, but all drill steels were sent to another shaft where a sawmill was also maintained for cutting all timbers. A total of five mechanics was maintained on this job for various services.

MUCKING

Operating two drillers on each heading, it was possible to secure two blasts a day, each of which was mucked in from 3 to 4 hours by a Nordberg-Butler mechanical mucker. This one-man air-operated shovel was used to remove all material from the heading, loading 1-yard Koppel side-dump industrial railway cars. These were hauled two to a train by a Whitcomb storage battery locomotive to the shaft where they were emptied into a sheet steel lined chute in which several carloads of muck could be stored. A hinged gate at the bottom, forming a continuation of the chute, was lowered as soon as the muck bucket was in the pit at the bottom of the shaft. This permitted quick filling of the bucket and minimized the waiting time of the muck train.

A Sullivan double-drum air hoist raised the 1-yard steel muck bucket to the top of the shaft where it dumped into a bin from which motor trucks were loaded, hauling the muck a distance of 2 miles for disposal.

SURFACE PLANT

At the top of the Allen Street shaft a Chicago-Pneumatic 12 x 10 motor-driven air compressor furnished air at 110 pounds for the drills and also to operate the Ransome pneumatic concrete placer which was used in lining the tunnel after the Blaw-Knox steel forms had been placed. At each shaft an American Type 9-P blower was installed for ventilation. Dynamite for both shafts was stored on the meadows about 2 miles distant.

THE PENNINGTON STREET SHAFT

The Pennington Street shaft where the blacksmith shop and saw mill were located was equipped similarly to the Allen Street shaft, except that a Sullivan Class WJ-3 compressor was used with a GE motor. The set-up of the saw mill was rather interesting as it permitted a maximum of work with a minimum of effort by the carpenters. A standard steel saw rig was located at one open end of a shed close by the stockpile which was slightly to one side of the shed. On the same side a wedge-shaped fence or permanent horse was built so that one end of each piece of lumber slipped from the stockpile could be rested on the horse and the other end turned around and placed on the bench at the left, and then the timber pushed forward onto the saw table. To permit lateral movement, a piece of pipe set with its ends in wood recesses with plenty of grease, furnished a convenient home-made roller which permitted the timber being moved across to cut various lengths with a minimum of effort. A motor generator set at the Pennington Street Shaft was used for charging the storage battery for locomotives operating at both shafts. A convenient frame was set up with a tackle so that the batteries could be swung out of the shed housing the motor generator set and lifted easily into the back of a light truck and transported to the other shaft.

THE WESTFIELD AVENUE SHAFT

The third shaft operated by the Northern States Contracting Co., was located at Westfield Avenue where the tunnel goes down to rock bottom, but has a soft gravel top. This section was operated under compressed air at about 5 pounds pressure. The shaft was on Westfield Avenue, one of the main thoroughfares of Elizabeth and every precaution was taken to minimize noise and inconvenience to local traffic and nearby residents.

A fourth shaft was located at Monmouth Road and Bailey Avenue in the midst of a residential district and was carried on in a similar manner to that used at the Westfield Avenue shaft.

CREATION OF THE JOINT MEETING

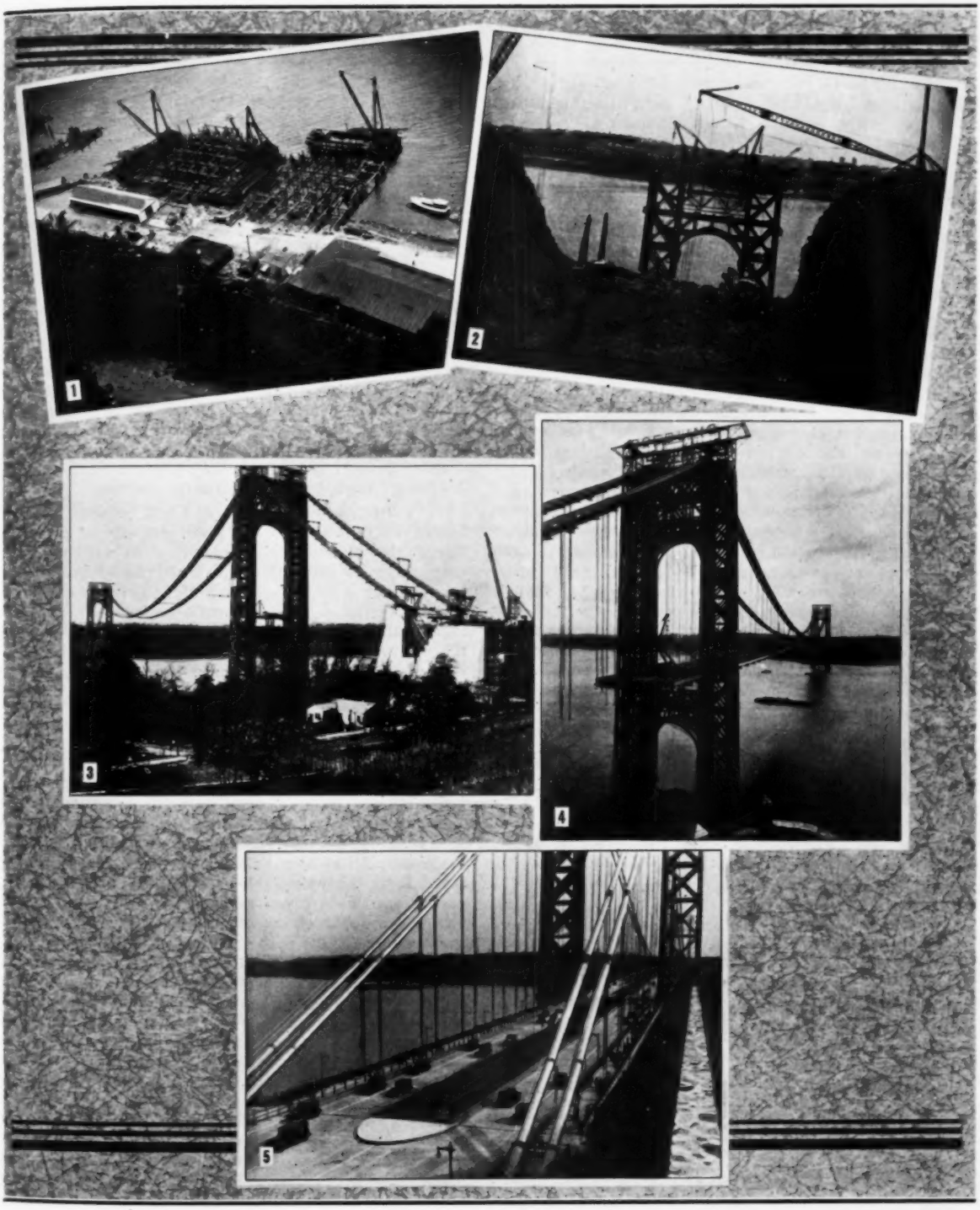
The Joint Meeting, which made possible the construction of the Supplementary Joint Trunk Sewer of which the work described herein is a part, was originally composed of seven municipalities in Union and Essex Counties, New Jersey, including Newark, Irvington, West Orange, South Orange, Millburn, Summit and Vailsburg, organized about 1900 through the efforts of the governing bodies of the seven municipalities. Alexander Potter, consulting engineer, New York City, was chosen Chief Engineer, and by his efforts and diligence, the Joint Meeting was brought into being. Mr. Potter assisted not only in the actual engineering reports which were required before the formation of the Joint Meeting, but also appeared before the various municipal governing bodies and assisted in the preparation of the enabling legislature.

Upon the completion of the sewer in 1903, Mr. Potter was retained as Chief Engineer of Maintenance, and has continuously served in such capacity up to and including the present time.

In 1922, the interested municipalities authorized Mr. Potter to prepare a report on the enlargement of the sewer built in 1902 and to report upon any other plans

(Continued on page 80)

The George Washington Bridge from Caisson to Service



THE WORLD'S GREATEST SUSPENSION BRIDGE ACROSS THE HUDSON RIVER OPENED TO TRAFFIC OCTOBER 25, 1931

1. *Work underway on the pier caissons on the New Jersey side in August,* 1927. 2. *Looking east through the rock cut in the Palisades showing the progress of the steel erection on the New Jersey tower in September,* 1928. 3. *The New York anchorage and spinning of the cables in October,* 1929. 4. *The roadways from both piers approaching completion toward the center of the span in December,* 1930. 5. *The* 3,500-*foot span completed and in service following its dedication October* 24, 1931, *and its opening to traffic on the following day, on which* 56,500 *vehicles (including one horse-drawn vehicle) and* 33,600 *pedestrians crossed the bridge.*

How the Other Fellow Did It

Construction Briefs

Welding a Gas-Tight Joint for Sub-Aqueous Lines

118. A very effective joint on an 8-inch gas line laid across a wide river and designed for an ultimate pressure of 100 pounds per square inch, was recently developed by a New York State contractor. It consists of a standard butt-weld reinforced by a short piece of 9-inch standard pipe which fits over the butt-weld and is itself welded to the pipe on both sides with fillet welds. This sleeve stiffens the pipe at the joint against bending stresses which might be very severe at times during the laying of the pipe from the barge. The sleeve also provides an extra factor of safety as two welds would have to prove defective before leakage could occur at a joint. Possibly the greatest advantage was the time and trouble saved in testing the joints. Each of the 9-inch sleeves was provided with a hole threaded for a ⅛-inch pipe nozzle. Because no air compressor, capable of providing the high test pressure required, was available, compressed nitrogen was used for testing. This was supplied at 1,800 pounds pressure in cylinders similar to oxygen cylinders. It is well understand that oxygen must never under any circumstances be used for testing pressure, because oxygen under pressure will react with explosive violence if it comes in contact with oil or grease. The cylinder of compressed nitrogen was connected to the 5/32-inch annual space between the pipe and the sleeve by means of a ⅛-inch pipe fitted with a valve and pressure gage. The pressure was brought up to 350 pounds per square inch and soapsuds were painted on the sleeve weld. If the pressure dropped and no leaks in the sleeve weld could be detected, this would indicate that the center butt-weld was faulty and the pipe would have to be cut and rewelded. The annular space had a volume of about 0.1-cubic foot and only 9 cylinders of nitrogen were used in testing 163 joints. 21.1.75

This Contractor Made Money with a Stop-Watch

119. When a contractor finds that his production on a road job or other work is slowing up, he must find where the losses are occurring. They frequently amount to only a few seconds here and a few seconds there. One Iowa contractor has developed a simple and effective check on these delays. He hired a young man who was wide awake and observant whose sole duty was to stand at the mixer with a notebook and a watch and record what he saw. His entries started at 6.00 in the morning and the second entry in his notebook was at 6.01 A. M. If a truck was slow, he noted its number, the exact hour and minute of the day, and the length of time the mixer waited for its load. If the hose became disconnected, he recorded the time of the enforced shut-down. If a high spot in the grade halted the forward movement of the mixer, that appeared in the book. The summation of the minutes and fractions of minutes at the end of the day made instantly available the total amount of time lost and the explanation of that loss and thus the records accounted for any shortage in the day's production. The effect of this observation is not only the knowledge of delay causes, it actually results in the elimination of many possible delays which would continue without the use of the system. The observer accustomed himself to the measurement of short periods of time by frequently looking at his watch and noticed that the mixing cycle of the mixer seemed unnecessarily long. He timed it and his checking resulted in the discovery of an easily remedied defect in the bell signal on the mixer, which was permitting each batch to be mixed 10 seconds longer than specified. The concreting crew regarded the checker with a friendly eye, considering him one of their own number and as anxious as any other member of the crew to turn out a large day's production. They became keener in watching for causes of delay and were more than usually eager to hasten the repair of breaks and to resume operations after a shut-down. 21.2.96

Underwater Concreting in Winter

120. When you are working on dry land and have to place concrete in the winter with the temperature around 10 degrees you know what to do; see that the aggregate is heated with a pipe under the sand, or the bins for both sand and stone are heated with steam pipes. Fine, but what do you do if the concrete is to be poured through a tremie and placed under water with the temperature just above freezing? Here is the scheme used by one large outfit which makes a specialty of underwater work. It has to pour summer or winter and has developed a method that has solved the problem.

All underwater concrete is poured in caissons, or dams formed of steel sheet piling which prevents water flowing through the section being poured. Thus the water within the dam can be handled just as you would the water in a wash basin, heating it to any desired temperature. This contractor puts in a perforated steam line and heats the water in the dam to around 60 degrees and then pours the concrete. With this method it is possible to get the full strength of the concrete within three or four days instead of waiting until "Nature takes its course" and warms up the water with the summer sun. K 5.18.31

A Method of Hanging Concrete Forms for Encasing Steel Floor Beams

121. On a grade elimination job in which the steel floor beams were used encased in concrete, the contractor developed a very effective method of hanging the forms. The floor beams were 33-inch Bethlehem sections, weighing 210 pounds per foot. From the lower flanges the bottom forms for the encasing concrete were suspended by hook bolts, which were tested to an ultimate strength of 7,000 pounds and so were amply strong for the work. The hooks were placed over the flange and a 3/16 x 1¾-inch strap below the flange extended across from one bolt to the other. The bolt was inserted into a cone nut which was turned up with a special wrench to hold the hook firmly against the flange and prevent turning. Into the lower end of the cone nut another rod was inserted which passed through the beam bottom, thence between the 4 x 6-inch stringers to the under side of pairs of 2 x 6's where a plate washer and nut completed the assembly. The cone nuts acted as bolt couplings and also spaced the beam bottom from the steel beam. On top of the pairs of 2 x 6's were placed the 4 x 6 stringers referred to above, running longitudinally about 3 feet on centers. These directly supported the beam bottoms and sides and by means of short posts and ledges on the beam sides, they supported the slab floor.

In removing the forms the bottom nut was slacked and the 4 x 6 stringers pulled out and then the beam side forms and the slab forms were taken out and lastly the beam bottoms and cone nut assembly, leaving in the concrete only the hook bolt, the exposed end of which was covered when the hole left by the cone nut was patched with concrete. 21.3.54

The Proposed Tariff on Petroleum and Its Products Part I

By
G. W. Knoblauch

THE past four or five years have witnessed a great and growing over-production of petroleum in the United States, resulting in a flooded market and low prices. Preceding and during this period, certain American companies operating in Latin America were bringing to our Atlantic seaboard a fairly uniform amount of oil from those countries, equivalent to about 10 per cent of our consumption. These imports showed little or no tendency to increase, and have been used to supply established local markets in the East, where, owing to lower production and transportation costs, they can be delivered more cheaply than Mid-Continent or California oil. Throughout the period in question, our exports averaged around 20 per cent of our domestic output, or just about double our imports.

With the avowed purpose of eliminating this competition in the East and of raising prices to the consumer, the Western producers are demanding a prohibitive duty or an embargo on foreign oil. Their effort to secure one or the other of these measures last Spring failed by a narrow margin, and is to be repeated at the coming session of Congress, which will then be called on to decide this question of direct concern to the American public in general, and not the least, to those engaged in engineering and contracting.

If from no other standpoint than theirs, the exclusion of foreign oil would, in the writer's opinion, work far more harm than good. The oil-mens' contention that it would aid employment in the oil-fields is refuted by their own admission to the effect that without drilling a single new well and without adding to their present pay-rolls, they could, by operating the existing wells at full capacity, triple their present output. When it is considered that this is around 900,000,000 barrels a year, while our imports are very little more than 100,000,000, it will readily been seen that any relief so afforded would be trifling.

On the other hand, testimony presented to Congress last Spring shows that in the East there are literally hundreds of plants wholly dependent for their existence on the availability of low-cost foreign oil, either as fuel or for use in the manufacture of gas and of asphalt. As to the last named, over 90 per cent of the asphalt used in the East is made from Mexican or Venezuelan petroleum, since no native oil fit for the manufacture of that product occurs nearer than California, and there in quantities barely sufficient to cover 45 per cent of the needs of the United States.

To quote Mark Cooper of Salisbury, Md.: "As a constructor of low cost country roads, low cost streets and resurfaced highways, I protest against the levying of a tribute on their construction in the form of an embargo on the raw materials on which they absolutely depend, and the wiping out of an industry which is now employing about 50,000 men and equipment worth more than $1,500,000 in the Atlantic Seaboard States."

Mr. McTarnahan, President of the Petroleum Heat & Power Co., of New York, stated that the oil burning equipment industry, representing an investment of $520,000,000 and employing 125,000 men, would virtually be ruined by an advance of even 50 per cent in the cost of fuel oil, and Congressman Nelson of Maine maintained that in his State alone, thirty-four manufacturing concerns with an invested capital of $50,000,000, besides the public utilities with another $75,000,000, will be seriously crippled if not killed if deprived of low cost fuel. Citations of this kind could be multiplied almost indefinitely.

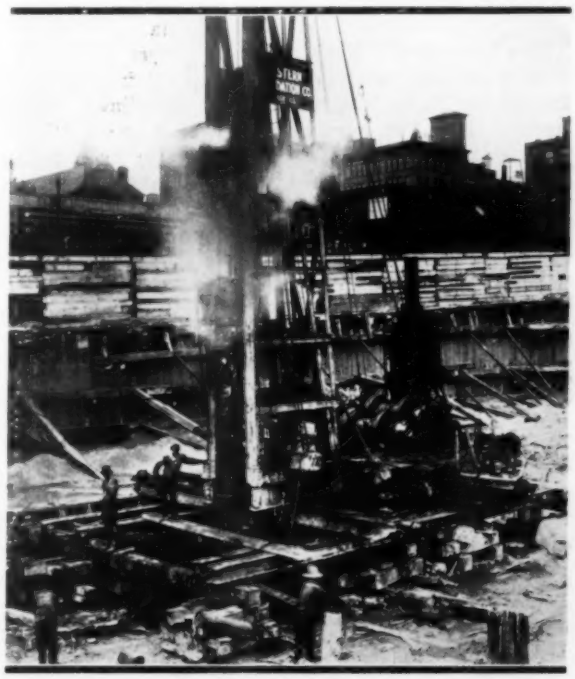
It would seem then that against the slight possible benefit that a tariff on oil may bring to the oil fields, it would cause severe harm to our Eastern industries. Neither should we overlook the fact that it would mean a tax on the pockets of all owners of cars, tractors and fuel-oil burning equipment, nor, lastly, that it would be directly opposed to the policy recommended by the Federal Oil Conservation Board, urging the importation of oil as a partial offset to the present enormous drain on our domestic reserves, a discussion of which is reserved for another article.

Welded Pipe Used as Piling on Cincinnati Job

A SPECTACULAR demonstration of the strength of welds made in a shielded arc was noted recently when welded pipe used as piling received 40 strokes with a 5,000-pound hammer without fracturing. The piling was driven by the Western Foundation Co. of Chicago for the new building of the Cincinnati *Times-Star*. Piles were driven to a depth of 72 feet with a steam pile hammer. Often after the piles had been driven 18 feet, they were straightened to a plummet, necessitating a further strain upon the welds. In no case were breaks or flaws discovered after the hammering and straightening.

The pipe was fabricated from steel of ½-inch thickness and the sections are 24 inches in diameter, and 12 feet in length. Longitudinal seams were welded with the shielded arc process, at the rate of 36 feet an hour. The pipe was prepared for welding with a single bevel of 30 degrees. The 12-foot lengths were then fused into 36-foot sections. The pipe was given a single 30-degree bevel and placed upon a rotating fixture. The circumferential welds were made in a total time of eight minutes.

The United Welding Co., of Middletown, Ohio, has fabricated about 3 miles of this piling with the shielded arc process of the Lincoln Electric Co. For this work 5/16-inch diameter Fleetweld electrodes in the special 18-inch length are used.



Driving 24-Inch Welded Pipe for Foundation Piles in Cincinnati

The Editor Comments—

Houses on Wheels

Contractors in the Middle West literally live on wheels. We have found whole construction camps mounted on old motor truck chassis and then the individual "one-family apartments" owned by foremen, truck drivers and others, with all the comforts of home.

One foreman's House on Wheels was attractively papered inside and then paneled with stained finishing strips. The house was wired for electricity with base plugs and wall plugs, and had a built-in china cabinet. Two days from the time of our visit, he was due to move in his furniture and be able to live close to the job.

Perhaps one of the most interesting Houses on Wheels was that belonging to a grading contractor. This unusually large wagon home contained stove, cabinet, office desk and two double beds, and was occupied by the contractor and his wife and four children. (Two of the children slept in a foreman's wagon house close by.) In order that the children might not lack amusement, there were two ponies, two dogs, a ram and a young goat, which romped around the field in which the wagon house was parked.

The great army of wagon homes among contractors and the vast number that are seen on the highways belonging to tourists, together with the rapidly increasing number of truck stores purveying all manner of goods throughout the rural regions, may well lead to our becoming a nomadic nation.

The Maintenance Man

Whether you meet him in Ontario or Florida, Arkansas or Maine, the Maintenance Man is a serious individual bent on keeping his gravel or dirt road free from washboards or soft spots. Whether he is riding a split log or a steel scraper, or is majestically perched on a big power maintainer he is just the same sort of chap doing his best that his road may warrant the praise of the community and the thanks of the casual traveler.

Those people who drive only in the densely populated districts of the east little realize just what the Maintenance Man means to the great population of the middle west and the Canadian provinces where there are thousands of miles of gravel and earth roads that without constant attention would quickly be reduced to ruts and pot holes. As it is, one can drive at 45 and 50 miles per hour on these roads with much more safety than on many of the so-called high-speed hard-surfaced roads. On the wide 40-foot roads of gravel one is a lot happier, if the wind is such that you do not get the dust from the passing car, than he is on the narrow 20-foot road with a raft of traffic and an ill-maintained shoulder that will swing his car if he chances to run off the hard surface a fraction of an inch.

The Maintenance Man is a font of information of all that is going on within a wide radius of miles, he is the friend of the school children who may pass him day after day on their long treks to school in the rural districts. We have praised the Builders of Roads and their fine work but let us salute the Keepers of Roads for their contribution to civilization.

The Hyper-Technical Inspector

An inspector should know the specifications, the plans, and the technical side of his work and with it he should have the great blessing of plenty of common sense. Here is a case that recently came to our attention where the "Great God Plans" meant more to the inspector than any amount of common sense. Caissons were being driven under a large structure for the footings of a new and larger structure. The round caissons were progressing rapidly and the work was humming.

Let us take a look at the well-drawn plans of the architect's office. In addition to all reference marks such as elevations and corners of other structures by which to tie in the new building there was a beautifully engrossed north arrow. All the reinforcing steel in the drawings was oriented with the arrow, probably because the drafting machine was set that way and it was easier to draw them that way than to change. The foreman had several of the caissons down to rock, the steel placed and the concrete gang ordered to come in at five o'clock to pour when the inspector who happened to know where north was even when he was down in the bowels of the earth demanded that the steel be changed as it was not oriented in the circular footing to correspond with the drawings. The foreman was fit to be tied, the superintendent for the foundation contractor could have committed murder with a smile on his face but the contractor himself clenched his teeth and said, "Change it." That change cost money and the change did not do one soul, even the inspector, one bit of good, but he maintained his authority, the inviolability of the structural plans and cast no reflection on the engineering judgment of the architect.

When Engineers Seem to Lack Engineering Sense

We recently ran into a waterproofing job under tide conditions in a trench. The waterproofing subcontractor was working under a penalty for leakage into the trench and was taking every possible precaution to render the waterproofing 100 per cent impervious to water even under pressure.

Can you imagine the contractor's amazement when the engineer party came down the trench, running lines for the grade of the pipe and calmly drove nails through the waterproofing for their grade line?

What can a contractor do when engineers lack common sense?

Theodore Reed Kendall

A Section of
CONTRACTORS
AND
ENGINEERS MONTHLY
Devoted to
News of Consultants
in the
Civil Engineering Field

The Consulting Engineer

November, 1931
New York
Vol. IV, No. 5

Various Activities of Baltimore Engineers

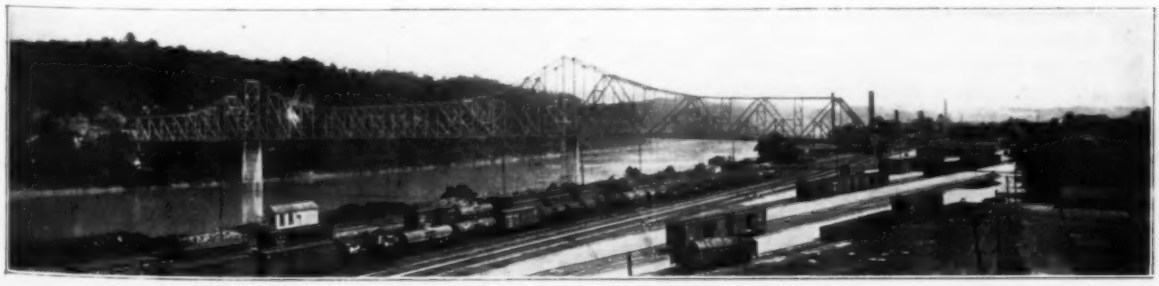
Office of the
J. E. Greiner Co.,
Baltimore, Md.

Left to Right: W. T. Ballard, Vice President; J. E. Greiner, President; W. W. Willoughby, Resident Engineer; O. H. Schroedl, Chief Draftsman; H. H. Allen, Vice President of the J. E. Greiner Co.

ACCORDING to a report from the J. E. Greiner Co., 1201 St. Paul St., Baltimore, Md., this company has recently completed plans for a number of bascule bridges to be constructed over various estuaries of Chesapeake Bay for the State of Maryland. It also has under construction a $1,000,000 gravity type concrete dam near Cumberland, Md., for the purpose of adding 2,600,000,000 gallons storage capacity to the city's water supply system. This company recently completed a cantilever bridge of 739-foot span across the Ohio River in the City of Ashland, Ky., and a similar cantilever bridge of 600-foot span for the State of West Virginia across the mouth of the Great Kanawha River at Point Pleasant, West Va. These two bridges are the first to be completed in programs of toll bridge construction undertaken by the States of Kentucky and West Virginia, the J. E. Greiner Co. being Consulting Engineers for the entire West Virginia program.

During the past eighteen months this firm has reported upon twenty-two bridges of various sizes and types. Nine were double track street railway bridges, four were steam railroad bridges, eight were state-owned highway bridges and one, a privately owned highway toll bridge. The scope of all the reports included a thorough field inspection, a complete stress analysis, determination of the feasibility of strengthening the bridges or the necessity for their removal, and in the cases where strengthening was recommended, preparation of general plans outlining the work to be done to

(Continued on page 73)



The New Ohio River Toll Bridge at Ashland, Ky., for Which the J. E. Greiner Co. was Consultant

The Consulting Engineer

A Section of

Contractors and Engineers Monthly

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Deleterious Substances in Concrete Aggregates

CIRCULAR 10, one of a series issued by the National Sand & Gravel Association, Inc., Washington, D. C., and written by F. C. Lang, Engineer of Tests and Inspection, Minnesota Department of Highways, should be of particular interest to consulting engineers as well as to sand and gravel producers. Mr. Lang's article discusses tests for quality of gravel and gives some illustrations of the results of using unsound particles of coarse aggregate in concrete subjected to alternate freezing and thawing. This paper was presented at the fifteenth annual convention of the National Sand & Gravel Association in St. Louis, January, 1931. Copies of this circular may be had on request from the National Sand & Gravel Asociation, Inc., Munsey Bldg., Washington, D. C.

Consulting Briefs

Hawley, Freese & Nichols, Consulting Engineers, San Antonio, Texas, are preparing plans for paving and storm sewers for Refugio, Texas, the bond issue for which was voted on in August. H. R. F. Helland, Associate Engineer, is preparing plans for a boulevard and bridges on the campus of the University of Texas, Austin, Texas, the cost of which is estimated at $125,000.

J. Paul Blundon, Charleston and Keyser, W. Va., has recently added P. H. Phillips, E. B. Connor, E. C. Garrison, William Gunnett, and Elizabeth Massing to his staff. Among the work under way in his office are the preparation of plans for a filter plant for Grantsville, W. Va., and the supervision of the construction of water supply projects for Frostburg and Pennsboro, W. Va. Mr. Blundon was recently called as expert witness in the City of Columbus, Ohio, vs. Ohio Fuel Gas Co. case in regard to the investigation of natural gas rates.

L. J. Jordan, 1340 Harding Place, Charlotte, N. C., is at present preparing plans for a dam for a swimming pool at Crescent Lake, Goldsboro, N. C. The construction of the sewer system for Columbus, N. C., is going on under Mr. Jordan's supervision.

Vaughan Engineers have announced the removal of their offices to the Claflin Bldg., 20 Beacon St., Boston.

H. L. Thackwell, Jacksonville, Texas, is at present preparing reports on the acidity of sewage at Tyler, on underpass and street improvement at Jacksonville and a plan for outfall sewers at Longview, Texas. Under his construction the Longview paving program is being carried on as well as the Sulphur Springs sewage plant and repairs on the pavement at San Augustine, Texas.

Cochrane, Wood & Witten, Tulsa, Okla., report that they are now preparing plans for the widening of the present reinforced concrete arch bridge at 11th Street over the Arkansas River at Tulsa at an approximate cost of $260,000, and for the Quanah Avenue Viaduct over the Frisco Railway at Tulsa at an approximate cost of $100,000. Under their general supervision the 21st Street Bridge over the Arkansas River at Tulsa is being constructed at an approximate cost of $425,000 and the 3rd Street Viaduct over the Frisco Railway, also at Tulsa, at an approximate cost of $60,000.

Henry J. Saunders, 644 Transportation Bldg., Washington, D. C., is now working on reports for the hearings before the Interstate Commerce Commission involving the recapture of excess income of Lancaster & Chester Railway, Santa Maria Valley Railway, San Luis Central Railroad, Birmingham & Southeastern Railroad and DeKalb & Western Railroad. He recently appeared as expert witness in the cases of Utah Railway Co. and Fort Worth Belt Railway.

Chas. A. Haskins, Finance Bldg., Kansas City, Mo., is now working on reports for the water and light rates of Larned, Kansas, the light rates of Norton, Kansas, and plans for water works systems at Princeton, and Houston, Mo., storm sewers for Great Bend, Kansas, water works extensions for Larned, Kansas, a storm sewer for Augusta, Kansas, and a new water supply at Checotah, Okla. Under his supervision a sewer system in Boise City, Okla., and water works extensions at Smith Center, Kansas, are being constructed.

New Field for Consulting Engineers

A FIELD not fully exploited by engineers is that of appraisal work, according to RAY SHARP BLINN, Consulting Engineer, New Smyrna, Fla. This field has been left more or less in the hands of skilled real estate men. Mr. Blinn points out that an appraisal engineer's preliminary training through the construction route is far better than through the salesmanship route, because of the engineer's habit of analysis.

In the matter of original and reproduction costs the engineer's capacity to summate is more nearly correct than the real estate man's idea. In the matter of getting supporting facts, in depreciation, obsolescence, indirect costs, furnishing situation plans, economic discussion and commercial status, the engineer is well trained for that type of work.

Ray Sharp Blinn

Every appraisal report should be strictly unbiased. Salesmen usually are prejudiced. The fee should cover the analysis, the stated market value and the reason for it. Any further amplifications or clarification of apparent ambiguities should be furnished at any time on request, either before or after the report is filed. Even if an owner of property does not wish to sell, the appraisal is of inestimable value as evidence before equalization boards in getting taxes reduced. To the owner who wishes to sell, a scientific appraisal is of value as the whole gamut of pertinent facts are laid before the buyer and nothing is left to guess at. If forgotten or neglected facts come to light after a sale has been made, the owner may be in for an unpleasant situation as well as possible legal difficulties.

Mr. Blinn has appraised over a thousand properties in Florida for all sorts of purposes.

Various Activities of Baltimore Engineers

(*Continued from page 71*)

bring the bridges up to a strength sufficient to carry modern loads safely. In the case of the four steam railroad bridges, those examined had capacities varying from Coopers E-30 to E-40 and it was desired to raise them to Coopers E-70. In the case of the street railway bridges the problem solved was the raising of the strength of the bridges and the incidental repairs necessary to make them safe for modern double truck street cars weighing, when loaded, 32 tons with 16,000-pound axle loads. During this same period this company prepared an elaborate report on the feasibility of constructing a freight line for the development of certain industrial regions in the City of Baltimore. This study embraced the complete survey of the region involved, projection of the proposed line on the ground, preliminary track layouts, design of bridges required and estimates of costs.

Wilson T. Ballard, Vice President of this firm, presented a paper entitled "The Chesapeake and Ohio Railway Three-Span Continuous Bridge Over the Ohio River at Cincinnati" at the annual meeting of the American Society of Civil Engineers in New York. An abstract of the paper was published in *Civil Engineering*, and publication of the paper in full in the *Proceedings* of the Society is pending.

Setting Up and Sighting

THE unusual title of "Setting Up and Sighting" was given by J. FREDERICK JACKSON, Consulting Engineer, New Haven, Conn., to a paper which he presented at the Forty-Seventh Annual Meeting of the Connecticut Society of Civil Engineers in New Haven, February 18, 1931. In his paper Mr. Jackson touches on a few of the high points in the relations between engineers and science and government and business. He also takes up a subject of great interest among engineers at the present time, the five-year plan of the Soviet Republic.

Bridge Recently Constructed in Toledo Supervised by New York Engineers

THE Maumee River Bridge for the City of Toledo, Ohio, was designed by and constructed under the supervision of WADDELL & HARDESTY, Consulting Engineers, 150 Broadway, New York City, with Cass Gilbert, Inc., as Consulting Architect and Leon Moissieff as Consultant on the suspension spans. This bridge, the main span of which is 785 feet long, carries one 54-foot roadway and two 6-foot walks. The main piers and anchorages are carried to bed rock while the approach substructure rests on concrete piles. The overall length is 3,885 feet. The total length of the approach spans which consist of deck plate girders and deck truss spans, is 1,965 feet. The girder spans are 154 feet long, 12 feet deep and weigh 160,000 pounds each. One of the approach girder spans is carried on two plate-girders 154 feet long and 12 feet deep, weighing 160,000 pounds. The structure was completed in September, 1931.

Jacksonville Consultant Prepares City Plan

A COMPREHENSIVE city plan of Jacksonville, Fla., has recently been prepared at the direction of the City Commission of Jacksonville under the guidance and supervision of the City Planning Advisory Board by GEORGE W. SIMONS, JR., Consulting Municipal Engineer, Jacksonville, Fla.

The plan is wide in scope and its preparation has involved extensive study and investigation as well as research and field observation. Throughout the numerous studies incident to the plan the practical aspects of the problem have been predominant, and an earnest effort has been made to avoid elaborate or impractical schemes too expensive or remote of realization. The plan as developed covers the following subjects: major street plan; traffic movement, control and parking; parks and parkways; recreational facilities and needs; zoning; rules for controlling subdivisions and plotting of land; public buildings, with discussion of a Civic Center; fire protection; street plantings; public utilities, relating to water supply, sewage disposal, drainage, refuse collection and disposal and airports; viaducts and bridges; street lighting; and schools and school locations.

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Legal Points for Contractors

These brief abstracts of court decisions in the contracting field may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt consult your own attorney

Edited by A. L. H. Street, Attorney-at-Law

Double Aspect of Accounts

A decision handed down by the Kansas City Court of Appeals in the case of Welch-Sandler Cement Co. v. Mullins, 31 S. W. 2d, 86, finally disposed of May 26, 1930, covers an interesting view of the rights of creditors on open acccounts. This was an action to recover for materials delivered to a contractor.

It is well established law that when a creditor submits a statement of account to his debtor, and where the latter by word or act indicates his assent to the correctness of the account, it becomes what is known in law as an "account stated." And, generally, failure of the debtor to object to the correctness of the account within a reasonable time will be construed as silent assent that the bill is correct as rendered. When an account has been thus stated, the creditor is entitled to sue for the amount and rely upon mere proof of the rendition of the statement and that the debtor has expressly or impliedly assented to its correctness. But, as shown by the following extract from the opinion of the Kansas City court, the creditor has his choice either to sue on the original account, in which case, of course, he must prove the correctness of the items involved, or to sue on the account stated:

"When an indebtedness exists upon an open account and thereafter the parties agree that the account is correct, the plaintiff has an election to sue upon the original account or upon the account stated. If he sues on the original account the defendant's agreement only has the effect of an admission because the account stated, as a contract, is waived; but if the suit is brought on the account stated it is brought on the subsequent agreement, and if the agreement is found to exist, then, in the absence of fraud or mistake, the defendant is absolutely bound thereby."

Liability Insurance Coverage

Contractors who carry insurance indemnifying against liability for injury to person or property up to a certain amount are protected by a decision of the Wisconsin Supreme Court against action of the insurance company in unreasonably rejecting an opportunity to settle a claim for an amount within the coverage of the policy.

A claim under a $5,000 liability policy could have been settled by the insurance company for less than that amount, but the company let it go to litigation, resulting in a $10,500 judgment against insured. He sued for reimbursement against the whole judgment and succeeded, on the ground that the circumstances showed that the company was guilty of bad faith in not adjusting, rather than defending the action. The Wisconsin Supreme Court said (Hilker v. Western Automobile Insurance Co., 231 N. W. 257):

"The parties knew when they made this contract that a large percentage of these cases are settled without litigation, and that such adjustments were one of the methods of protecting the interests of the insured which were commonly used to discharge the duty imposed upon these companies by their policies. That this was in the minds of the parties when they made this contract is shown by the fact that the policy taken from the insured all right to adjust any claim, and requires him to aid the company in effecting a settlement.

When Honesty Pays

One very simple way of running the risk of losing a lot of money is to be inaccurate in making out proof of a fire loss under an insurance policy.

The uninformed may suppose that if he overstates his loss or understates the amount or value of property saved from the fire, he is merely getting a chance to receive from the insurance company more than he is entitled to. It is easy for the insured to believe that he needs the money more than the wealthy insurance company does.

But those few holders of insurance policies who have taken the trouble to read them—and thereby to find out in advance just where they will stand in case of loss—are familiar with a little clause to the effect that if the insured tells any fibs in his proofs of loss, etc., the insurance company need not pay him one cent—need not even return what he has paid by way of premiums. That provision ought to make insured quite "religiously" opposed to swearing to a false proof of loss.

A Nebraska man and, in another case, a New Hampshire man, made the very plausible excuse, for overstating their losses that they did not expect the insurance company would be willing to pay the full amount of the claim and therefore added a bit on, so that it could be knocked off by the way of compromise. The highest courts of those two states said that the excuse was N. G. and that the insurance companies did not have to settle under the policies.

Yea, verily, it pays to be honest.

Contractor Was Liable for What Sub Did in This Case

"We want damages!" These words coming to a contractor vie with "it might have been" as being "the saddest words of tongue or pen."

In the case of Tooker v. Lonky, 147 Atl. 445, decided by the New Jersey Court of Errors and Appeals, plaintiffs wanted damages, and got them, because a wall of the building occupied by them as tenants in Perth Amboy collapsed just after a rainstorm, as a result of the digging of a 3-foot trench preparatory to the construction of a building on an adjoining lot.

When the plaintiffs jumped the general contractor, he confidently replied, "Am sorry, but I did not cause the wall to collapse. I sublet the excavation work to Mathiasen, and you will have to look to him to reimburse you for your damage. He was an independent contractor."

But this defense did not stand up in court, for the Court of Errors and Appeals said:

"An independent contractor is liable in exoneration of the employer only for defects in doing the work, and not for defects in the design or plan. . . . Here there was evidence to the effect that the defendants [the general contractors] established the line which was to guide the subcontractor, and also assisted in placing the stakes. And upon the whole we think that the evidence justified the conclusion, if the jury saw fit to draw it, that the execution of the design or plan of the excavation which was furnished by the defendants, and which the subcontractor followed, was the proximate cause of the injury."

The Rock Section of a Tunnel and Open Cut Sewer

(Continued from page 66)

which might be feasible to give sewer facilities to the interested municipalities which had grown so rapidly since the construction of the original sewer.

The report disclosed the need for facilities for other municipalities besides those in the original organization. Again, the same consulting engineer was called upon not only to prepare the engineering reports, but to lend his energies to the formation of the Joint Meeting of eleven municipalities, which besides the towns listed above (Vailsburg is no longer a member) include Maplewood, Union, Roselle Park, Hillside and East Orange. The city of Elizabeth, although not a part of the Joint Meeting, joins in the construction of the sewage disposal plant with the other municipalities.

Only the intimate knowledge of the design as well as the requirements of each municipality made it possible to form the Joint Meeting and Mr. Potter, who was so eminently fitted to step into this role, did so with the result that in 1926, four years after the report on the Supplementary Joint Sewer was prepared, the contracts between the various municipalities were signed.

PERSONNEL

Contract B of the portion of the Supplementary Joint Trunk Sewer in Elizabeth was awarded to the Northern States Contracting Co., St. Paul, Minn., Leo Butler, President and Kevin Butler, Superintendent. Alexander Potter, New York, was Consulting Engineer for the work with Arthur T. Armstrong as Resident Engineer.

$125,000,000 Road Fund for 1933

THE Secretary of Agriculture has recently apportioned to the states $125,000,000 previously authorized for Federal Aid in road construction for the fiscal year ending June 30, 1933. In making the apportionment 2½ per cent was first deducted for administration. The remainder was then apportioned on the basis of area, population and mileage of rural post roads in the various states. From the apportionment to each state there was then deducted one-fifth of the emergency advance funds granted last December. The net apportionment available for new projects amounts to $105,875,000. The new funds are available to the states for immediate obligation on projected construction. The apportionment has been made 2½ months in advance of the usual date so that the states may get an early start on plans for next season's construction.

The Bureau of Public Roads, through which Federal Aid funds are administered, has indicated a desire to accept policies designed to increase employment and to protect labor. Among the acceptable policies are the fixing of a fair minimum scale for unskilled labor and restrictions giving preference to local unskilled labor and to citizens of the state in which the work is being done. If legal, the use of Federal Aid will be allowed where labor is employed direct and where such projects can be carried on economically to provide local employment. Restrictions as to hours per day and days per week in order that workers may be continuously employed are also acceptable. The Bureau of Public Roads will not accept the disbarment of a contractor from the award of a contract because he is a nonresident of the state, provided he is the lowest responsible bidder, nor will it accept the limitation of materials to those produced within the state.

Last season Federal Aid road work was greatly accelerated because the regular authorization of $125,000,000 was supplemented by an emergency authorization of a loan of $80,000,000. At the peak of the season more than 155,000 men were engaged on Federal Aid work. The new apportionment is as follows:

APPORTIONMENT OF FEDERAL AID FOR FISCAL YEAR 1933

State	Sum Apportioned	Deduction Account Emergency Advance Funds	Net Apportionment Available for New Projects
Alabama	$ 2,589,898.00	$ 339,729.00	$ 2,250,169.00
Arizona	1,790,177.00	234,096.20	1,556,080.80
Arkansas	2,124,109.00	277,631.40	1,846,477.60
California	4,742,676.00	621,646.60	4,121,029.40
Colorado	2,290,520.00	301,566.40	1,988,953.60
Connecticut	791,500.00	104,098.20	687,401.80
Delaware	609,375.00	80,000.00	529,375.00
Florida	1,654,660.00	217,287.60	1,437,372.40
Georgia	3,168,944.00	415,599.20	2,753,344.80
Idaho	1,532,055.00	201,607.00	1,330,448.00
Illinois	5,156,577.00	680,023.20	4,476,553.80
Indiana	3,108,083.00	409,185.80	2,698,897.20
Iowa	3,223,079.00	423,273.80	2,799,805.20
Kansas	3,327,526.00	438,460.20	2,889,065.80
Kentucky	2,294,955.00	300,943.00	1,994,012.00
Louisiana	1,767,386.00	229,585.40	1,537,800.60
Maine	1,087,328.00	143,159.80	944,168.20
Maryland	1,031,160.00	135,750.40	895,409.60
Massachusetts	1,739,536.00	228,292.00	1,511,244.00
Michigan	3,842,291.00	504,276.40	3,338,014.60
Minnesota	3,426,272.00	449,998.60	2,976,273.40
Mississippi	2,194,388.00	286,947.20	1,907,440.80
Missouri	3,819,780.00	505,364.60	3,314,415.40
Montana	2,564,563.00	334,386.00	2,230,177.00
Nebraska	2,597,647.00	341,606.20	2,256,040.80
Nevada	1,602,681.00	209,927.60	1,392,753.40
New Hampshire	609,375.00	80,000.00	529,375.00
New Jersey	1,685,045.00	221,561.40	1,463,483.60
New Mexico	1,993,001.00	260,657.60	1,732,343.40
New York	6,152,620.00	810,113.20	5,342,506.80
North Carolina	2,935,362.00	385,355.00	2,550,007.00
North Dakota	1,970,643.00	259,706.40	1,710,936.60
Ohio	4,571,398.00	599,707.60	3,971,690.40
Oklahoma	2,938,305.00	385,270.20	2,553,034.80
Oregon	2,027,318.00	264,057.40	1,763,260.60
Pennsylvania	5,343,256.00	702,588.60	4,640,667.40
Rhode Island	609,375.00	80,000.00	529,375.00
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South Dakota	2,033,359.00	267,594.60	1,765,764.40
Tennessee	2,650,535.00	348,376.40	2,302,158.60
Texas	7,787,837.00	1,017,616.00	6,770,221.00
Utah	1,408,865.00	185,304.20	1,223,560.80
Vermont	609,375.00	80,000.00	529,375.00
Virginia	2,293,481.00	301,100.40	1,992,380.60
Washington	1,935,403.00	254,186.60	1,681,216.40
West Virginia	1,337,294.00	175,076.80	1,162,217.20
Wisconsin	3,039,195.00	398,482.00	2,640,713.00
Wyoming	1,564,886.00	205,876.60	1,359,009.40
Hawaii	609,375.00	80,000.00	529,375.00
Totals	$121,875,000.00	$ 16,000,000.00	$105,875,000.00

Winter Works on Roads

GENERALLY when winter comes highway construction stops. This year, however, many states are laying plans to keep as many men busy as possible. In Michigan plans are being made to carry on an extensive state highway and local road program. Between $7,000,000 and $10,000,000 will be spent on the state highway system by the end of the year. Work is to proceed on twenty-two bridge projects scattered throughout sixteen counties to give a wide distribution of work. Minnesota is soon to take bids on eight bridges and on monolithic concrete culverts on 65 miles of grading as a step in her program for providing winter work. Southern states are also going ahead with as much winter work as can logically be done.

Paving cannot be done very successfully in cold weather, but there are numerous other tasks that can be accomplished in winter, such as grading, preparation of drainage structures and bridge building. In the past few years considerable advance has been made in the technique of handling construction work, and particularly concrete work, in the winter and it is now possible by means of a little foresight and precaution against low temperatures, to carry on certain types of projects as well in winter as in summer.

Annual Meeting of Highway Research Board

THE eleventh annual meeting of the Highway Research Board, National Research Council, will be held on December 10 and 11 in Washington, D. C. The meetings, which will be held in the Auditorium of the National Academy of Sciences, will be devoted to discussions of reports of research activities in relation to highway finance, transportation, design, materials and construction, maintenance and traffic.

Jacking the Pipe Under a 20-Foot Fill Carrying the Paved Intersection of Five Streets

Installation of Additional Drainage Culverts Without Interference with Traffic

THE installation of a 48-inch culvert under a 20-foot embankment carrying the paved intersection of five streets while the thermometer stood at zero without interrupting traffic is an interesting example of modern methods in handling drainage opening problems through high fills and under existing pavements. The project was located in the exclusive residential district, Mission Hills, Johnson County, Kansas, just over the state line from the residential section of Kansas City, Mo.

Approximately 20 years ago, at what is now the intersection of 50th Street and High Drive, a concrete box culvert, 4 x 4 feet, was constructed. Ample in size at the time to carry the run-off from the area which it drained, the ultimate paving of streets and building of homes in that watershed made it inadequate to serve the need in times of heavy rainfall. This culvert lay under the paved intersection of five streets and it seemed particularly desirable to avoid the expense and inconvenience of tearing out the pavement. To solve the problem, it was decided to jack 128 feet of Armco corrugated iron pipe through the fill alongside the original culvert.

Work was started in January. The first construction step was the digging of a working trench in which to make the jacking set-up. This could have been done very easily in warm weather but with the ground frozen solid by temperatures ranging from zero to 18 degrees below, blasting was necessary. To make matters more difficult, the flow from the old culvert which discharged at an angle of 45 degrees to the new one, had scoured out a large pool about 3 feet deep across the site of the jacking trench. A ditch 50 feet long, blasted through solid rock, drained all but a foot of the water. The pool was then filled in with rock from an old rubble masonry headwall which had to be removed before the pipe could be started into the fill. This wall was 2 feet thick at the top and 5 feet thick at the bottom. It was frozen solid and a compressed air pavement breaker was used to demolish it.

To care for the flow from the old culvert, a drop inlet of rock was laid from the concrete box to a 12 x 12-inch timber box which was used to carry the flow under the lining timbers which were placed over it on railroad ties imbedded in the rock used to backfill the pool. The setting of the lining timbers to grade and the construction of a backstop completed the jacking set-up. Once the jacking was started, the work was no longer directly affected by weather conditions. An air spade, powered by a portable air compressor, was used for excavating. Because of the low temperature, it was necessary to keep a coal fire in a salamander and pass the air through hot coils to keep the air tools from freezing. A special wheelbarrow with a narrow body was used to remove the spoil from the pipe. A crew of four men made the installation, one man excavating, one loading the wheelbarrow and wheeling it to the end of the pipe and two unloading the wheelbarrow and jacking. A deposit of loose limestone was encountered the entire length of the job. To prevent these flat rocks from becoming wedged in the corrugations and hindering the forward movement of the pipe, a smooth black iron shield was used on top of the pipe its full length. For the final 20 feet of pipe a stone arch was erected, serving the double purpose of combining the inlet of the two waterways into one area of sufficient size and also of beautifying the inlet.

The long distance jacked and the adverse weather conditions make this project one of considerable interest. The installation was made by the Road Supply & Metal Co., under the direct supervision of G. F. Selby, for the J. C. Nichols Companies.

EXCAVATING FOR THE FOUNDATIONS OF RADIO CITY IN NEW YORK

This photograph depicts a portion of the work handled by Clarence L. Smith, Contractor, and shows four Lorain-75 shovels which have already dug down 25 feet in the tough rock. To the left, at street level, another Lorain is handling the heavy blasting mats.

Construction Industry News

Caterpillar Tractor Co., Peoria, Ill., has announced the appointment of G. M. Walker as Advertising Manager. Walter H. Gardner, formerly Advertising Manager, has been made Manager of the Special Sales Division. This newly formed division is created primarily to market Caterpillar engines and subassemblies to other manufacturers. The full line of Caterpillar engines, both gas and diesel, will eventually be adapted for the use of equipment manufacturers generally.

Continental Motors Corp., Detroit, Mich., has announced the concentration of its motor manufacturing operations in Muskegon, Mich., as a further step in the economy program instituted in the Spring of 1930 when the management of the company underwent a change. Current production schedules necessarily curtailed due to the inactivity of business has prompted Continental to center its output in Muskegon. The corporation will continue to maintain its general offices, engineering, tool design, tool room, Ford clutch and aircraft engine departments at its Detroit plant.

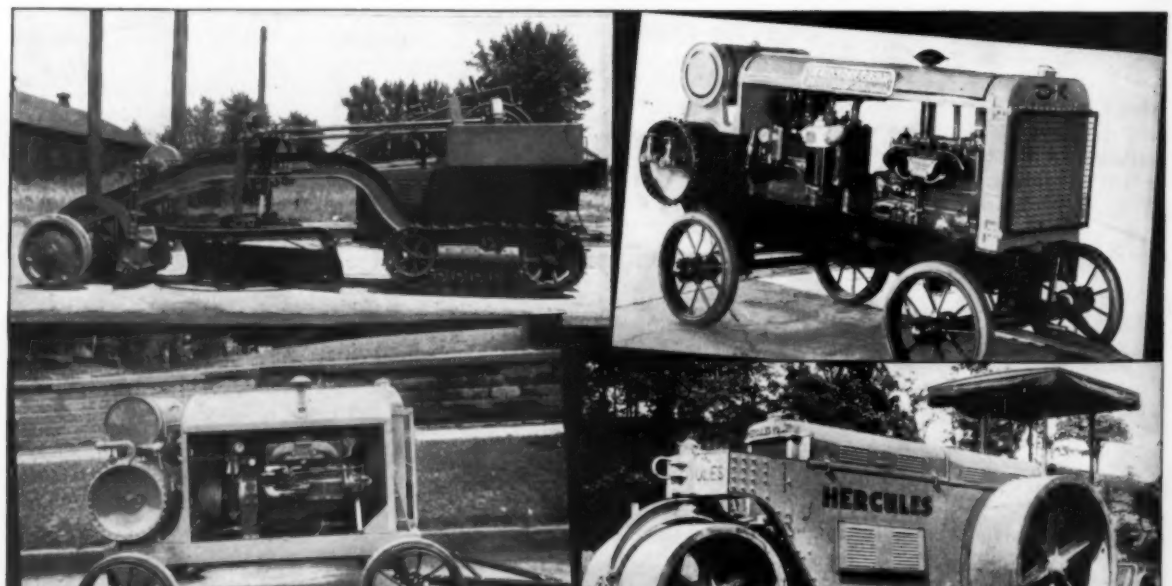
Tips, Inc., 515 Cathedral St., Baltimore, Md., is a new concern organized to distribute standardized cutting and welding tips, apparatus and accessories. Otto W. Dieffenbach, who was formerly Secretary of the Black & Decker Mfg. Co., is President. Tips, Inc., will sell, by mail only, the products of leading manufacturers of cutting and welding equipment.

Philip A. Koehring, President, National Equipment Corp., Milwaukee, Wis., was killed on October 31 by a hitch-hiker whom he had befriended while driving his automobile, according to newspaper reports received just as this issue goes to press. The untimely death of this leader among manufacturers of construction machinery comes as a great shock to his many friends in the industry. In addition to being executive leader of the National Equipment Corp., which includes the Koehring Co., Insley Manufacturing Co., T. L. Smith Co., Kwik-Mix Concrete Mixer Co., Parsons Co., and the C. H. & E. Manufacturing Co. Mr. Koehring had twice been President of the Milwaukee Association of Commerce.

Chain Belt Co., Milwaukee, Wis., has announced that its subsidiary, Stearns Conveyor Co., Cleveland, Ohio, has received the order for 1½ miles of belt conveyors for construction work on the Hoover Dam. The order consists of approximately 1,200 troughing and return idlers for the belt conveyors.

The Texas Co., Asphalt Sales Department, New York City, has announced that on November 15 Texaco calcium chloride will be added to the line of asphaltic street and highway products which it now markets. The road building industry will be the principal market for Texaco calcium chloride. The material acts as an efficient dust-layer on gravel, macadam and similar surfaces, and is recommended for use in the curing of concrete highways where it is spread thinly over the surface.

American Manganese Steel Co., Chicago Heights, Ill., has announced that E. R. Dougherty has joined the Amsco Sales organization to work with E. F. Mitchell, District Manager in the Chicago territory with headquarters at 1414 McCormick Building.



SOME OF THE CONSTRUCTION EQUIPMENT RECENTLY PURCHASED BY THE PENNSYLVANIA DEPARTMENT OF HIGHWAYS

Upper left: one of a fleet of seventy Cletrac-Galion patrol graders. Upper right: an O.K. compressor, one of the battery of thirty-five. Lower left: a Davey compressor of which six were purchased. Lower right: one of forty Hercules road rollers. All this equipment is powered by Hercules engines

Ames Baldwin Wyoming Shovel Co., Boston, Mass., has been formed through the consolidation of seven manufacturers of shovels and tools, including the Ames Shovel & Tool Co., Boston, two plants; Pittsburgh Shovel Co., Pittsburgh, Pa.; Wyoming Shovel Co., Wyoming, Pa.; Baldwin Tool Co., Parkersburg, West Va.; Hubbard & Co., Pittsburgh, Pa., and Beall Brothers, Alton, Ill.

The sales personnel of the Ames Baldwin Wyoming Shovel Co., with executive offices at North Easton, Mass., will consist of Norbert T. Jacobs, General Sales Manager, with C. B. Steffey as Assistant. Lou Braden is District Sales Manager for New York, Pennsylvania and New Jersey, assisted by L. T. Bryan, F. K. Tovey and J. T. Hughes. Harold Cunningham is District Sales Manager for Delaware, Maryland, District of Columbia, Virginia, West Virginia, North and South Carolina, Ohio, Kentucky, Indiana, Missouri and Kansas, assisted by S. F. Cobb, Robert C. Rogers, H. J. Ziegler and Sand A. Hulfish. H. S. Bywater is District Sales Manager for Michigan, Illinois, Wisconsin, Minnesota, North and South Dakota, Nebraska and Iowa, assisted by C. P. Tate. George C. Barton is District Sales Manager for Georgia, Florida, Alabama, Tennessee, Mississippi, Louisiana, Arkansas, Oklahoma and Texas, assisted by G. E. Brown. H. M. Pforsich is District Sales Manager for California, Oregon, Washington, Montana, Idaho, Wyoming, Colorado, Utah, New Mexico, Arizona and Nevada, assisted by G. W. Naylor. The other officers of the company are: Richard Harte, President, L. J. Reay, Treasurer, and E. T. Nipher, Manager of Production.

Chicago Pneumatic Tool Co., New York City, has announced the removal of its office and service station in Seattle, Wash., from 1743 First Avenue South to 3201 First Avenue South. C. Kirk Hillman has recently been appointed District Manager. The new quarters are larger and permit carrying a complete stock of repair parts as well as representative items of the company's various products.

Link-Belt Co., Chicago, Ill., announces the merger of the George W. Moore Co., of Chicago, with H. W. Caldwell & Son Co., a subsidiary of Link-Belt Co. The combined units are to be known as the Caldwell-Moore plant, Link-Belt Co., with offices at 2410 West 18th St., Chicago, Ill.

Heltzel Steel Form & Iron Co., Warren, Ohio, has announced the installation of additional machinery and equipment in the recently completed addition to its plant. In accordance with the statement made by the President, J. N. Heltzel, this is an outward expression of the company's confidence in the future.

Paving Brick Meeting to Be Held February 10-12, 1932

THE twenty-sixth annual meeting of the National Paving Brick Association will be held at The Palmer House, Chicago, Ill., February 10, 11 and 12, 1932. The program for the last two days will include papers and discussions of the latest practices in the design and construction of streets and highways, particularly the vitrified brick type. These sessions will be open to the general public and anyone interested in street and highway development is invited to attend.

The program now under preparation will be presented by prominent engineers, contractors and paving authorities. It will include descriptions of recently constructed brick highways, streets and boulevards; efficient management of brick paving contracts; and discussions of the application of highway research to modern brick pavement design, including filler and cushion construction. The use of brick for resurfacing and replacement will be featured. One session will be devoted to a field inspection of one of the recently completed brick resurfacing improvements near Chicago.

Distributors' Bulletin Board

The distributors of construction equipment listed below have made changes this month in their cards appearing in the Distributors' Directory on pages 103 *to* 129 *of this issue of* CONTRACTORS AND ENGINEERS MONTHLY:

Alban Tractor Co., Inc., Baltimore, Md.
American Hardware & Equipment Co., Charlotte, N. C.
C. H. Arnold Co., Inc., Pittsburgh, Pa.
Beckwith Machinery Co., Pittsburgh, Pa.
Bublitz Machinery Co., Kansas City, Mo.
Hunter Machinery Co., Milwaukee, Wis.
Keller Tractor & Shovel Co., Inc., Detroit, Mich.
R. G. Moeller Co., Detroit, Mich.
Nixon-Hasselle Co., Chattanooga, Tenn.
S. & L. Equipt. Co., Fort Wayne, Ind.
Service Supply Corp., Philadelphia, Pa.
Slade Tractor Co., Inc., Albany, N. Y.
The Taylor Tractor Co., Columbus, O.
Tractor-Equipment Co., Newark, N. J.
J. H. Welch Co., Inc., Buffalo, N. Y.
Geo. W. Ziegler Machy. Co., Pittsburgh, Pa.

Moving 85,000 Cubic Yards for a Bridge Approach

WILLIAMS BROTHERS, general contractor of Pryse, Ky., was the subcontractor for the approach fill of the new bridge at Fort Daniel Boone, Ky. Their contract involved handling 85,000 cubic yards of material of which 61,000 cubic yards was solid rock. For moving the dirt and rock on this contract, Williams Brothers used a Lima 101 1¼-cubic yard gasoline shovel, two Camel dump wagons and two 2½-ton International trucks. With this equipment they were able to complete their work in 20 per cent of the scheduled contract time.

The drilling equipment consisted of an 8 x 10-inch Ingersoll-Rand compressor and two I-R jackhammers. The Madison County approach consisted of 60,000 cubic yards, including 50,000 yards of limestone which was placed in 20-foot lifts. The rock was broken up with holes on 6-foot centers, shattering it so that it was easily handled by the shovel. The shovel handled from 50 to 60 cubic yards per hour and was worked on 10-hour shifts. Williams Brothers is a partnership consisting of Buehl Williams, General Superintendent, in charge of the work at Boonsboro, and Carl Williams, Superintendent.

Loading a Camel with Rock at the Quarry

The Puljack in Use Moving 48-Inch Concrete Culvert

An Effective Hand Pulling Device

A HAND-OPERATED pulling machine which enables one man to develop a high straight-line pull is made by the Puljack Manufacturing Corp., 98 Pine Street, New York City, under the name Puljack. This device is used for moving or hoisting heavy loads, pulling sheet piling, removing stumps, and can be operated by an ordinary laborer after ten minutes instruction. The Puljack is made in two sizes. The Junior for light pulling up to 10 tons weighs only 46 pounds while the larger machine, weighing 198 pounds, pulls to 15 tons straight-line and with blocks included up to 50 tons.

This machine has two speeds and reverse. High speed is used for taking up slack in the cable and for light pulling, and low speed for heavy pulling. The reverse gives control at all times in lowering loads. It operates in any position. The operator moves the 5-foot handle back and forth similar to the stroke in rowing a boat. Each stroke turns the drum and reels in the cable. A simple system of leverage multiplies every pound of power applied to the handle.

For light pulling the handle is put in the high speed and cable is pulled in at about 25 feet per minute until all slack is taken up and about 1,500 pounds tension is put on the cable. For heavier loads the handle is put in the low speed plug and each move of the handle turns the drum and pulls the cable about 3 feet per minute. The drum holds 60 feet of ¾-inch cable. Puljack outfits are furnished with cable somewhat under the capacity of the machine to save rigging labor. For the exceptional job where the pull is over the capacity of the ¾-inch and ⅞-inch cable furnished, the cable must be doubled or a larger cable substituted.

The frame and drum of the Puljack are one-piece castings of high grade steel. No bolts or nuts are used on any working part. The machine has a chrome nickel steel axle, a special manganese steel tumbler, sector bearings and pawls.

A Welded Reinforcing Fabric

A SQUARE or rectangular mesh fabric for highway reinforcement made from cold drawn wire electrically-welded at the intersections of the transverse and longitudinal wires is one of the products of the Concrete Engineering Co., Omaha, Nebr. The result of electrically welding or fusing together of these wires is a rigid connection at every joint. This welding is accomplished without loss of tensile strength of the fabric either longitudinally or transversely, due to the fact that the process of electric welding not merely solders the wires together, but actually fuses the metal of the intersecting wires into one homogeneous section.

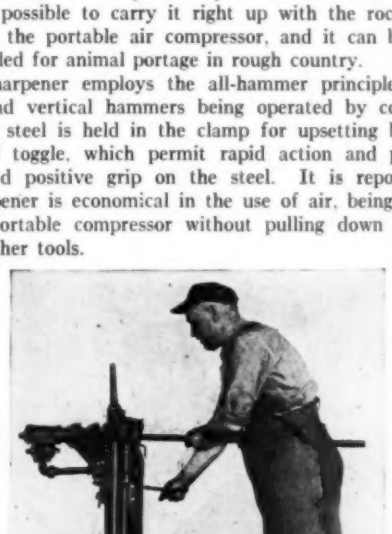
Ceco welded fabric has square or rectangular mesh and is furnished in a wide variety of gages and spacings varying from the lightest to the heaviest limits of manufacture. The weight varies from 25 to 56 pounds per 100 square feet and it has been demonstrated that these weights reduce cracking from 35 to 70 per cent in pavement of like thickness. Ceco welded fabric is adapted for use in reinforcing roads and pavements and other slabs resting on the ground. The high ultimate strength of the cold drawn wire provides the reserve strength particularly for roadway slab where stresses resulting from unusual loads cannot be accurately determined.

A New Light Drill-Sharpening Machine

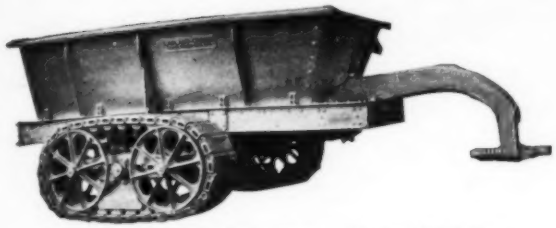
HERETOFORE many contractors, quarrymen and public works departments have been forced to depend on hand blacksmithing for sharpening rock drill and hammer drill steel because the small amount of work required would not warrant the purchase of a heavy-duty drill sharpening machine. The Sullivan Machinery Co., 814 Wrigley Bldg., Chicago, Ill., has announced a Class E sharpener designed to bring the advantages of mechanical sharpeners to the group mentioned above. The new sharpener, known as Little Smithy, makes cross or rose 6-point bits to 2½ maximum gage on ⅞-inch or 1-inch steel. It forges collar shanks, and dies are available for any steel section. In addition, it forms and sharpens concrete breaker, pick or chisel bits on steel as large as 1⅛-inch hexagon.

This new sharpener weighs only 350 pounds and occupies a floor area only 18 inches square. The machine stands 4 feet in overall height and operates satisfactorily without other foundation than that provided by bolting it to the floor or to light timbers. The portability of this Class E sharpener makes it possible to carry it right up with the rock drilling tools and the portable air compressor, and it can be readily disassembled for animal portage in rough country.

This sharpener employs the all-hammer principle, its upsetting and vertical hammers being operated by compressed air. The steel is held in the clamp for upsetting by a foot lever and toggle, which permit rapid action and provide a secure and positive grip on the steel. It is reported that this sharpener is economical in the use of air, being operated from a portable compressor without pulling down the pressure at other tools.



The New Sullivan Little Smithy Sharpening Machine



A LaPlant-Choate Bottom-Dump Wagon Equipped with Roadlayer Crawler Tracks

A Redesigned Bottom-Dump Wagon

A BOTTOM-DUMP wagon, which is built entirely of steel, hot riveted and electric welded throughout, is designed to carry 7 or 8 yards of earth and is equipped with Roadlayer crawler tracks, is now built by LaPlant-Choate Manufacturing Co., Cedar Rapids, Iowa. The frame is constructed of heavy section channels both riveted and electric welded. The wagons have an arched one-piece, box-type, cast steel tongue made from special alloy steel. A heat-treated pullbar bolt is provided with a spring to absorb the jerks of starting where work is done by tractors, while an extra hole is placed in the tongue for use when operating the wagons in a train. The tongue is securely bolted to the 21-inch wagon deck by eight 1-inch bolts and also to the front wagon cross-tie by three 1-inch bolts, thus giving it a secure connection to the wagon.

A cast steel box is provided at the rear of the wagon through which the rear drawbar is fastened. The pullbar casting on the rear is the same as on the front. The hand wind for the bottom-dump doors is an integral part of the winding drum and the trip ratchet. By combining these in one casting, the usual strain for winding up the wagon and for carrying the load is not carried from the shaft. A simple swivel type step is provided on the left side, so attached that it will fold up under the wagon body when obstructions are hit. The step is made like an open gate so that it will clean itself of mud.

The high wagon tongue arch has been designed to afford the necessary clearance to permit full turning of the tractor. The rigidity of the one-piece casting enables the driver to back the wagon easily and the curve of the tongue prevents it from coming in contact with the tractor or wagon to which it is attached. The wagons in a train can turn at a 102-degree angle, making them flexible in close quarters. When hooked in a train, the upper pullbar hole in the tongue is used. This pulling point is in a direct line and parallel with the line of force on the main frame, and also pulls in the center of it.

The winding cables for the doors are held in alignment by special tapered sheaves and brackets. The front equalizer sheave and bracket is hung on a spring cushioned bolt to absorb the shock of the opening doors, and it also absorbs the jolts on the doors when heavy loads are dropped on them. The cable is one piece, dead ended on the winding drum so the cable has equalized strain and both doors are drawn evenly.

All LaPlant-Choate wagons are equipped with hand wind at the rear including the hand wind lever and trip lever. When the hydraulic door wind is specified, provision is made on all hand wind models by a projected shaft so that the hydraulic unit can be quickly coupled by means of a spline coupling. The hydraulic cylinder device is set on the right hand side of the wagon. Use of the hydraulic hand wind eliminates one man, increases the operating speed, eliminates the danger of a man climbing on and off the wagon and makes it possible to wind the doors practically instantly. The hydraulic hoist enables the tractor driver not only to trip the doors from his seat, but also to wind them up by merely pushing a lever.

A New 1½ to 2-Ton Truck

A NEW truck known as the Model T-18 powered with a 6-cylinder 60-horsepower GMT-200 engine with a 1½ to 2-ton capacity has been announced by the General Motors Truck Co., Pontiac, Mich. This truck will be built both as a 131 and a 157-inch wheelbase product with 9 and 12-foot bodies of any type desired for construction work. Dual wheels and tires are offered on the 157-inch wheelbase at no extra cost, and are provided on the 131-inch base at a cost of $25.00.

Forged spoksteel wheels add to the rugged appearance of the truck. Standard finish is Murat green with Venetian yellow striping. Twelve additional colors are available at no extra cost. A feature of this truck is the flat tube and fin type radiator, which offers positive protection against freezing. In this type of radiator, the tubes expand into cylindrical shape if frozen, thus preventing breaking. Stress absorbers on the frame give an additional margin of strength, while freedom of engine vibration is assured through the heavy crankshaft which is statically and dynamically balanced and counterweighted and equipped with a torsional balancer. With a turning radius of 22 feet 9 inches for the 131-inch wheelbase and 28 feet 3 inches for the 157-inch wheelbase, the new truck is easily handled in traffic and in close quarters.

A New Truck-Mounted Arc Welding Unit

AN arc welding machine designed particularly for mounting in a truck and driven by the same engine that propels the truck is announced by the Northwestern Manufacturing Co., Milwaukee, Wis. This portable arc welder consists of a special 200-ampere Hansen arc welding generator with a range for metallic arc welding of from 60 to 325 amperes. To this is attached, at the option of the purchaser, a 1½-kw, 110-volt, D. C. auxiliary generator, which furnishes power for operating electrical tools and lights. The unit is operated through V-belts driven from a special four-groove pulley mounted on the drive shaft. The belt and pulley are protected from dust and dirt by a special housing. When the unit is to be used, a clutch lever mounted in the cab is released. This disengages the rear end of the truck, and engages the governor on the engine as well as the driving pulley.

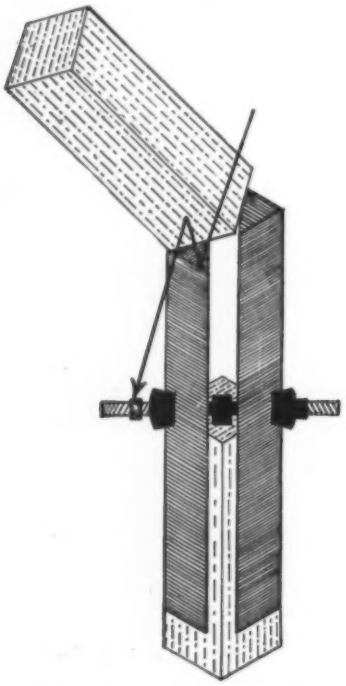
The unit can be mounted on and used with any standard make of truck. Provision can be made for carrying oxygen and acetylene cylinders as well as tools that the operator may desire to use.

The Hansen Arc Welder Mounted on a Truck

A Simple Strong Splice for Scaffold Timber

BUILDING and tearing down a wooden scaffold consumes a great deal of time and results in the waste of a great deal of lumber because of the damage through nailing. The Expansion Scaffold Clamp Co., 36-40 Bowne St., Flushing, N. Y., has developed a simple and effective clamp which by actual test has shown that it is possible to splice anything from a 3 x 3 upright to a 6 x 6 twenty-two times faster than splicing by nailing. This clamp was developed and patented by David Salustri, who had been building scaffolds for 25 years and knew what was needed by contractors to save their time and money.

The clamps are ⅛ x 3-inch angle irons with one about 4 inches longer than the other, which helps to guide the new uprights into place when the splicing clamp is used. A ½-inch bolt is carried through both sides of the clamp and at the center has two small welded lugs to prevent the bolt turning when the one nut is tightened. Each angle iron is held against the timber by a cast iron washer. At one side a nut is screwed against the washer and at the other the nut is left loose until the upper timber is placed. Then by merely tightening this one nut the splice is complete.



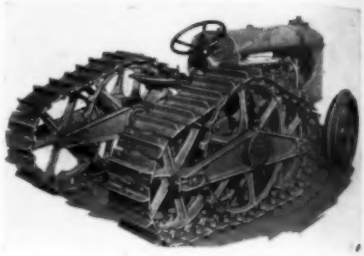
A New Scaffold Timber Clamp Showing the Method of Inserting Timber. The Arrow Indicates the Single Nut Which Tightens the Clamp

The holes in the two angle irons through which the bolt passes are large enough to permit a change in the angle of the bolt so that 3 x 4 and 4 x 6 timber can be spliced. It is only necessary to burr the threads on the ends of the bolts to make this a one-piece article.

New Crawler Tracks for Industrial Tractors

THE new Peerless crawler tracks, which were designed to give positive traction on soft ground, gravel, sand or snow, have recently been developed by the Peerless Track Co., St. Joseph, Mich., to replace the wheels on Fordson industrial tractors. These tracks are substantially built and are easily attached to a Fordson tractor with the use of ordinary tools and without altering the tractor in any way excepting to remove the wheels.

Each rear wheel on the tractor is replaced by a Peerless track unit, which is a double sprocket and frame with an idler wheel at either end. The track is driven around these wheels by the double sprocket. Both top and bottom of the double sprockets are in mesh with the track with no less than 12 teeth on each side engaged at the same time. The track itself is composed of 34 sections or shoes, cast of special alloy steel, and are pinned together with two strong pins. The shoes are interchangeable and the track may be changed from one side to the other. The idler wheels are carried on Timken roller bearings protected from dust and dirt and lubricated by means of dustproof pressure grease cups. They are adjustable so that the tracks may be easily tightened whenever necessary. The units on either side oscillate individually, allowing the machine to pass over rough ground or obstructions. The sprocket wheels are somewhat smaller in diameter than the standard wheels which they replace. This lowers the gear ratio and reduces the engine strain. There are 10 cleats on each track in contact with the ground at the same time, giving a total of over 1,600 square inches of continuous ground contact.



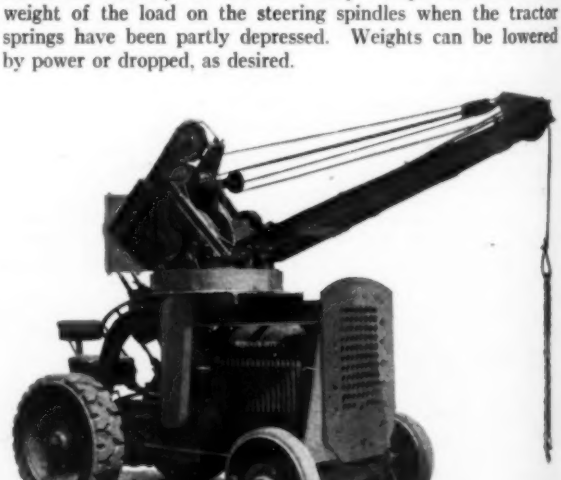
A Fordson Tractor Equipped with Peerless Tracks

A Small Full-Swing Crane

THE Manly Full-Swing crane, made by the Western Machine Works, 1312 West 22nd St., Chicago, Ill., is adaptable to utility work of all kinds such as digging manholes, excavation work, setting up transformers and light poles, laying water mains, gas pipes and sewer pipes, backfilling, and handling heavy timber such as bracing in vaults and congested places where space is limited. It may be used to load trucks in small spaces, for piling timber and for loading and unloading freight cars.

The cable drums are located immediately above the turntable, making it possible to operate the crane continuously in any direction, as there is no twisting of cables when the crane revolves. The turntable is unusually sturdy as it revolves on rollers with track both above and below the rollers. The automatic feature of the counterweight, which can be increased or decreased to meet requirements, increases the range of weights of loads that may be handled.

A steel front-end stabilizer attached to the crane main frame immediately behind the Manly bumper transmits the weight of the load on the steering spindles when the tractor springs have been partly depressed. Weights can be lowered by power or dropped, as desired.



The Manly Full-Swing Crane

A New Fully Convertible Shovel

A MODEL 55 fully convertible ½-yard shovel was recently announced by the Austin Machinery Corp., Muskegon, Mich. This machine is equipped with a 50-horsepower Waukesha gas engine, has a standard shovel boom 16 feet 6 inches long, a twin dipper stick 12 feet long and a capacity of 11 cubic feet struck measure.

Two shafts mounted in ball or roller bearings comprise the machinery unit in the upper frame. Only eight spur gears and five bevel gears are used. Both the lower and upper frame are cast steel, the latter being accurately machined to assure the proper alignment of the machinery unit.

A feature of this Model 55 is the two-speed transmission built into the power take-off unit, which provides two speeds for all operations. The crawlers are of the self-cleaning type with large idler rollers, reducing the power required for traction.

The New Austin Model 55 Shovel with 16½-foot Boom

A Power Drag Scraper That Works Around Corners

THE path of a power scraper is usually a straight line from the digging or loading point to the dumping point. There are, however, situations that require the scraper to turn a corner somewhere along its span and work along two paths at approximately right angles to each other. A patented "dog-leg" device has been developed by Sauerman Bros., 464 South Clinton St., Chicago, Ill., which makes this condition entirely feasible for satisfactory operation.

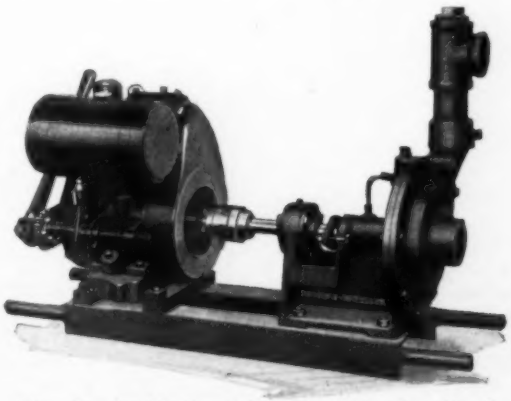
Where the customary drag scraper installation consists of a two-drum hoist, two operating cables for inhauling and outhauling the scraper bucket, and two guide-block supports, one at each end of the span, the "dog-leg" installation consists of a three-drum hoist, three operating cables, and three guide-block supports. The third block support is, of course, at the point where the scraper makes its right-angle turn, and the third operating cable is a "center-haul" cable which serves always to pull the bucket toward the turning point on both the inhaul and the backhaul. This center-haul cable passes over a guide block at the turning point to a rod connecting the front and rear bridles of the scraper, so that it pulls on the front bridle during the inhaul but slides to the back of the bucket to pull on the rear bridle during the backhaul. The regular loadline pulls the loaded scraper from the turning point to the dumping point, and the regular pullback cable returns the empty bucket from the turning point to the digging point.

A Sauerman Drag Scraper Making a Right-Angle Turn with the Aid of a Dog-Leg Device

Some of the situations that make an installation of this sort desirable are: digging or reclaiming from storage parallel to railroad tracks and turning a corner to mount a car loading incline; excavating in a basement or reclaiming from a storage room where columns make it impossible to work radially from the hopper or dump; digging lengthwise in trenches and turning to drag the spoil onto the bank. It is also possible to use this device with two tractors, one with a double-drum and one with a single-drum hoist, instead of the regular three-drum scraper hoist; or to equip the second tractor also with a two-drum hoist and use the extra drum for operating a rapid shifting device.

A Portable All-Purpose Centrifugal Pump

A NEW 2-inch portable centrifugal pumping unit weighing only 165 pounds and which can easily be carried by two men, has been announced by the Deming Co., Salem, Ohio. The Deming-Mueller pump is particularly adapted for dewatering sewers, trenches, cellars, reservoirs, etc., pumping either clear or dirty water. The 1-horsepower 1,750-rpm, single-cylinder, four-cycle engine is air cooled and is furnished complete with a carburetor, high tension magneto, fuel tank and foot starter. The pump is of the non-clogging open type impeller with both 2-inch suction and discharge. The pump and engine are direct-connected through a flexible coupling and are mounted on a structural steel base, fitted with handles at each end for easy lifting and carrying. The entire unit is 39 inches long, 20 inches wide and 19 inches high. Its capacity varies from 50 gallons against a 55-foot head to 120 gallons against a 20-foot head.



The Deming-Mueller 2-inch Portable Centrifugal Pumping Unit

The New Austin Badger Shovel

Curved Boom Features New Tractor Shovel

A NEW tractor-mounted shovel with a full three-quarter swing for the boom but with no tail swing and having a curved boom which increases the loading height of the shovel has been announced by the Austin-Western Road Machinery Co., 400 No. Michigan Ave., Chicago, Ill. This Austin Badger shovel is powered with a McCormick-Deering Model 20 industrial unit and the tractor is regularly equipped with a transmission having a number of speeds forward and one reverse. The rear axle of the tractor is used as a jack shaft and by means of two heavy roller chains running over sprockets on the shaft to both sprockets on the crawlers, the manufacturer has retained the power and the various speeds of the tractor for moving the shovel.

The upper end of the mast is anchored by an A shaped truck frame reaching back to the extreme end of the main frame which serves to utilize the entire weight of the unit as a counterbalance to the dipper load, and also equalizes the pressure on the pivot post bearing and trunnion. The boom is formed from two 12-inch channels shaped to give strength and with the upper end curved to give greater clearance for the dipper handle. The dipper handle is 5 by 10 inches in size and is made up of two heavy section rectangular steel tubes to which are welded the crowd racks.

The dipper handle socket is a heavy steel casting pivoted on the bucket ribs. By means of the rake bars the bucket can be set in three positions to change the angle of the dipper on the dipper handle to suit various working conditions. The door of the 11-foot capacity bucket is one piece of steel plate with the hinge members, which are heavy steel forgings, extending the full length and welded solidly in place, thus reinforcing it and keeping it from springing. The latch is a heavy steel bar, bevelled on both ends so it can be reversed when worn. It is released by the operator through a double lever trip. The teeth or rooter points are of manganese steel of the renewable and reversible type, held in the bases by keys.

The machinery table contains the working parts of the shovel and rests on the base with double the support found in ordinary construction. The center pivotal post is of large diameter and is fitted with a heavy bronze thrust washer and bushing to take both vertical and side loads. The weight of the entire unit is carried on these thrust members in conjunction with four machined radial trunnions. The radial track on which these trunnions roll is part of the main base casting and is machined perfectly smooth and true. The circle swing gear is cast integral with the base unit, and the machinery table, which is also a heavy steel casting, is provided with a skirt which serves as a guard covering the base unit. Separate front and rear axles with rubber-tired wheels are used for quick moving of the shovel over the road when desired. The Austin Badger may be equipped for clamshell operation, as a backfiller, trench hoe, dragline and as a crane.

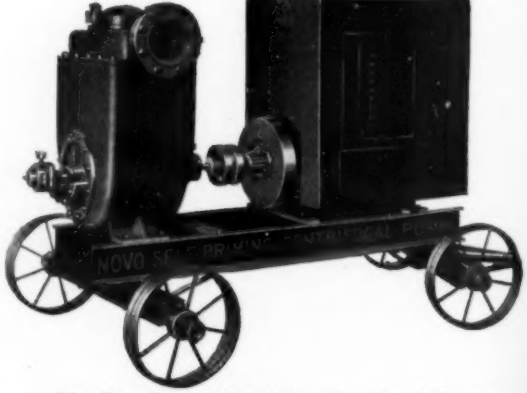
A New Self-Priming Centrifugal Pump

A NEW self-priming centrifugal pump, the design of which eliminates a number of accessories usually required for self-priming, has been developed and recently annnounced by the Novo Engine Co., Lansing, Mich. The principle of operation is identical with that of a standard centrifugal pump, the self-priming feature being built into the pump, making it a completely self-contained unit capable of priming itself whenever necessary and at all suction lifts up to and including any attained by a standard centrifugal pump.

The arrangement of the ports and passages in this pump are such that the priming water cannot be thrown out of the discharge but will circulate until it has expelled the air from the suction pipe. The pump requires filling but once before starting, after which the proper level is maintained at all times whether the pump is handling water or air or is entirely stopped. The pump will handle a considerable amount of air continuously but if it receives too much air, as when the water gets below the inlet of the suction hose, it will simply stop pumping water. The pump will again pick up its prime as soon as the suction pipe is again covered with water and will prime itself without attention from the operator.

The steel impeller is of the open type, making it possible for the pump to handle a large portion of such solids as sand, gravel, muddy water and silt without damage to the pump. The self-cleaning feature is effected by causing the main stream of water to pass down and through the bottom of the casing after the water has passed through the impeller. Any solids that would drop to the bottom of the pump are in this way swept out with the discharge. The impeller is readily accessible by merely removing the outer head and a cleanout plug is provided at the bottom of the casing.

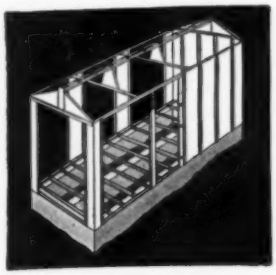
These Novo self-priming centrifugal pumps with Novo power units are mounted on welded steel bases with welded-in tubular cross members. They are built in 3, 4 and 6-inch sizes, with capacities ranging from 400 to 1,300 gpm. The 3-inch models are mounted on two-wheel trucks and the 4 and 6-inch models are furnished mounted on heavy welded steel four-wheel trucks, to give ready portability. The pumps can be furnished without the trucks and mounted on skids if desired.



The New Novo Self-Priming Centrifugal Pump

Sectional Powder Storage Magazines

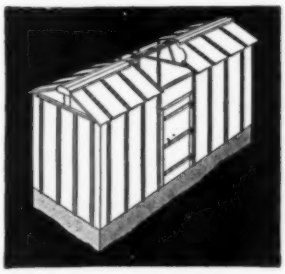
A PORTABLE powder magazine built of 14-gage copper-bearing steel and provided with complete ventilation through a weather-proof ventilator extending the full length of the roof and which is strong and easily erected because of the lap-joint construction and interchangeable parts is the product of Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio. The base of the frame of this portable magazine is made up of end sills, side sills, connectors and floor joists. It is assembled on and anchored to a foundation made of brick, stone, concrete block, monolithic concrete or wooden posts. The corner sheets are bolted in place forming a support for the top angles. The location of the door is decided upon and door jambs are put in place. The door takes the place of two side sections and can be placed where desired. The gables and ventilator sections are bolted in place. All side and end walls are identical and all carry the same erection mark. If the magazine is to be lined it should be done after the side walls are up.



No. 92 Powder Magazine Partly Assembled

The end roof sheets are bolted down and then construction is continued with standard sheets completing both slopes together. These sheets will support a man's weight. A ridge roll is placed over the ventilator and fastened to it by cap screws. The ridge roll or vent cap is removable from the outside so that the ventilator can be repainted. It is impossible for anyone to get into the magazine through the ventilator.

This magazine, although not bullet-proof, is endorsed by inspectors and meets the requirements of state laws for the storage of blasting and sporting powders. When used to store high explosives, this No. 92 must be lined with brick or sand fill, making it entirely bullet-proof. When the magazine is so lined there is a slight additional charge for punching holes necessary for attaching the lining.



Assembly Completed Showing a Section of the Roof and Ridge

The magazine has a door designed to prevent unauthorized persons from gaining admittance. This steel door is fitted with a three-point lock which fastens the door at the top, bottom and side. The bolts operate simultaneously from a throw disc at the center. The entire lock mechanism which controls the throw disc is mounted in a case on the inside of the door. The only parts visible on the outside when the door is closed are the operating handle and the cylinder of the lock. The door is lined with 2-inch planking level with the lock and lock mechanism, and it is a simple matter to nail additional planking to a sufficient thickness to make a bullet-proof door.

A Locomotive-Type 2½-Ton Crane

A LOCOMOTIVE-type crane of moderate capacity intended for use in storage yards, by water supply and other municipal departments, and by highway and subway contractors, has been developed by the Silent Hoist Winch & Crane Co., 762 Henry St., Brooklyn, N. Y. The design and construction of the Krane Kar permits full rated loads to be raised and lowered and swung from side to side, boomed up and down and transported over considerable distances. This crane will pass through openings as narrow as 5½ feet and as low as 7 feet. The rated capacities of the Krane Kar are from 5,000 pounds at a 5-foot radius to 2,500 pounds at a 10-foot radius. The rated capacity loads may be swung through 180 degrees.

The Krane Kar

The traction wheels are in front where they also support the load hanging from the hook. The Krane Kar is steered by the rear or trailing wheels. This arrangement permits easy steering when the crane is loaded. The mounting of the rear wheels is of the caster type, so providing a three-point suspension for the entire chassis. With the heavy front wheels, the location of the power plant, crane operating mechanism and counterweight-stabilizers, outriggers, jacks or similar devices are not required.

As the boom seat is located directly over the front axle, the extra boom length is useful to provide a large effective working range. Power for operating the crane mechanism is obtained from the gasoline engine by a roller chain drive from a two-speed power take-off attached to the transmission. There are separate winches for the load and boom lines which are so constructed that power is applied to lower the load as well as to raise it. The boom swinging mechanism includes an enclosed worm gearing and built-in clutch unit, the same in size and design as that for the winches. The gasoline engine power plant is of ample size to do the work for which the crane is rated; to provide reasonably high road speed when necessary to move long distances; and for traveling over roads both good and bad. The engine is equipped with an electric starter, a generator, storage battery, electric head lights, tail light, and electric horn.

The New Galion Master 4-Cylinder Motor Roller Powered with an Allis-Chalmers Model K Engine

A New Warning Torch for Construction Work

The Cleveland Flaming Torch

A CYLINDRICAL type torch, built of gray iron with accurately fitted joints and with a capacity of three quarts of kerosene or light fuel oil, which produces a full visible flame for 36 to 48 hours, has been developed by The Consolidated Iron-Steel Mfg. Co., 1292 E. 53rd St., Cleveland, Ohio, under the name of the Cleveland Flaming Torch. This torch is 8 inches overall and has a diameter of 7¼ inches. The burner is reported to decrease oil consumption and protects the flame in all weather.

The torch is equipped with a sliding handle which nests and which is looped so that the torch can be either suspended or set in place. It is finished in red enamel and is packed three to a carton with a shipping weight of 35 pounds.

A Tractor-Mounted Gravity Dump Wagon

THE Hughes-Keenan Iron Mule with the gravity dump body, having a 3-yard level capacity and handling 4 yards with a heaped load, is manufactured by the Hughes-Keenan Co., Mansfield, Ohio. This Iron Mule is powered by a McCormick-Deering Model 20 industrial tractor or an Allis-Chalmers Model U industrial tractor, the same general construction applying for both. The body is the gravity dump type, with special latches holding it in loading position until released by the driver. The same latches lock it in dumping position at nearly a 90-degree angle.

A sturdy steel channel section frame supports the body with its load and the Iron Mule mechanism, the tractor being hung in this frame and acting as a driving unit only. A special axle at the radiator end, called the oscillating axle, allows the wheels to set at different elevations but always keeps them erect. This permits easy steering when running over rough ground and also relieves all strain on the tractor and Iron Mule frame. At the drive end are heavy duty crawlers mounted on an auxiliary axle which is rigidly connected to the Iron Mule frame by heavy steel castings. The tracks are driven through a pair of wide face special alloy steel cut gears on each side, one gear being attached to the drive axle, the other to the drive sprocket on the track. All gears are fully enclosed in a dust-tight case and run in oil.

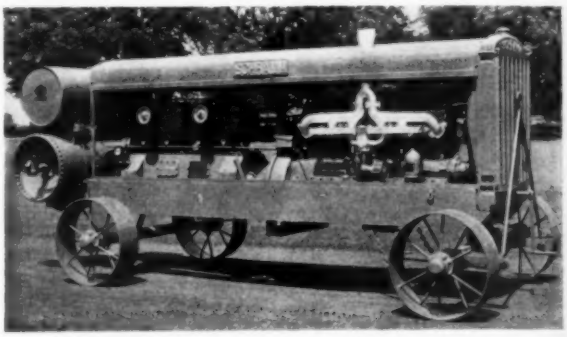
The Hughes-Keenan Tractor-Mounted 4-Yard Iron Mule

The Largest Portable Air Compressor

A 540-CUBIC foot displacement unit, consisting of an 8 x 6-inch four-cylinder compressor driven by either a gasoline or a diesel heavy-duty Buda engine and claimed to be the largest multi-cylinder portable air compressor, has been announced by Schramm, Inc., West Chester, Penna.

The principles of the construction of this unit are the same as those built in the other smaller Schramm units. One of the features of the new machine is the self-aligning clutch which permits the operator to disengage the compressor unit while the engine is being started. After hand starting is accomplished and the engine is running smoothly, the full compressor load can be thrown on by a simple pull of the clutch handle.

Any mounting, spring trailer, highway trailer, steel or rubber tired wheels, is obtainable to meet the requirements of any construction job.



The New 540-Cubic Foot Compressor

Fast Operating Hose Coupling for Air and Water

COUPLINGS which make tight joints that do not leak either air or water yet swivel freely and which are used extensively on hoses in construction work are made by C. B. Hunt & Son, Salem, Ohio. These Quick-As-Wink couplings are connected or disconnected by one man in a moment yet they cannot come apart accidentally. Quick-As-Wink couplings from ⅛ to ¾-inch inclusive are disconnected by pressing the two clamp jaws together with thumb

A Quick-As-Wink Hose to Hose Coupling

and finger, requiring no key or tools. To make the connection, the two parts are just pushed together. The couplings from 1 to 4-inch are supplied with a key which is necessary only for disconnecting. When joining the couplings they are pushed together and can only be locked together in the right way and once joined they do not become separated accidentally.

The free-swiveling action of these couplings prevents hose kinks and makes the hose straighten out automatically. Hose ruptures are thus eliminated and the water flows in a steady stream enabling the hose to give its full service. The castings of these couplings are made of Tobin bronze, an extremely malleable metal that will stand great strains and abuse without breaking. The sealing tube, which makes the tight connection, expands as the pressure is increased, thus making the connection tighter.

Newark

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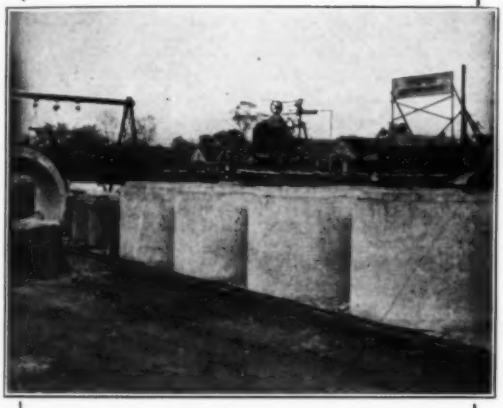
"It makes a better joint"

Easily laid at small expense with perfect flow line.



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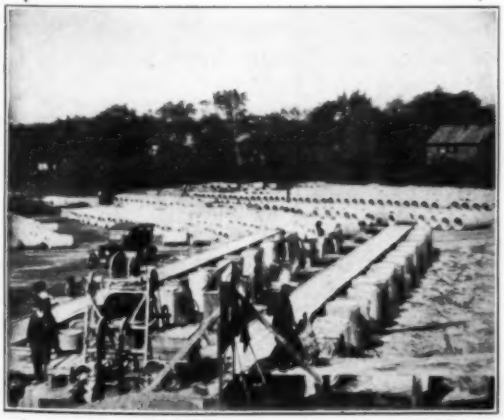

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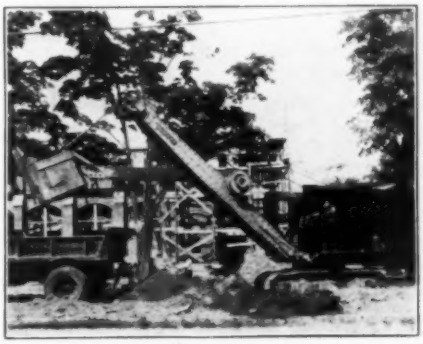

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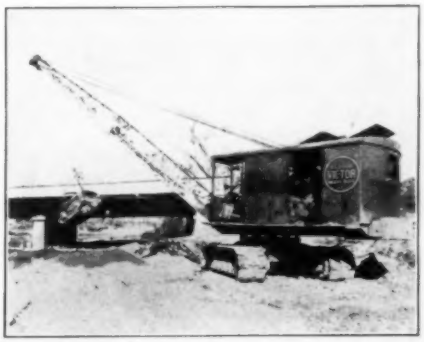


The Osgood Company

Marion, Ohio, U. S. A.

Air Springs for Heavy Trucks

ILLUMINATING data which have been uncovered through official tests conducted by the United States Bureau of Public Roads to determine the intensity of impact delivered to highways by heavy trucks have demonstrated the advantages of devices mounted on trucks to minimize such impact. The Cleveland Pneumatic Tool Co., Cleveland, Ohio, manufacturer of Cleco Gruss air springs, has sold thousands of these springs to provide road cushioning for trucks and to absorb the destructive strains and reduce truck maintenance expense.

Cleco Gruss air springs have a compressing capacity more than three times greater than that of pneumatic tires and they add to the absorbent capacity of rubber tires. In addition, they relieve the torsional truck strain through their ability to raise on the low side. These air springs are telescoping cylinders mounted between the steel springs and the frame of a truck to absorb the shock and vibration of highways. The part attached to the frame is a rigid housing in

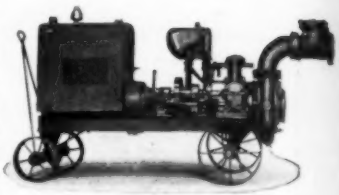
A Contractors' Heavy-Duty Truck Equipped with Cleco Gruss Air Springs

which the piston and sliding sleeve, which is attached to the steel spring, move up and down. The air spring is inflated with air, like a pneumatic tire, through an air valve at the top. The piston rests against the cushion of air. When a blow is delivered upon the wheel of the truck it is transmitted to the spring, from there it passes to the piston and sliding sleeve, causing them to move upward, building up the air pressure sufficiently to meet and absorb the blow. The recoil is practically eliminated and the little that remains is checked by the downward stroke of the piston.

Actual tests by the vibrometer, an instrument that accurately measures and records road shocks, show that Cleco Gruss air springs eliminate from 50 to 75 per cent of the road shock present in the first condition when merely pneumatic tires and steel springs are used, while a combination of pneumatic tires and steel springs with hydraulic checking or snubbing devices eliminate only from 25 to 50 per cent of the vibration.

A New Line of Automatic-Priming Centrifugal Pumps

A NEW line of Lawrence Vortex automatic priming centrifugal pumps for dewatering excavations, quarry pumping, drainage, and work of a similar nature has recently been announced by the Lawrence Pump & Engine Co., P. O. Box 70, Lawrence, Mass. The ability of these pumps to work on suction lifts up to 27 feet makes them especially adapted for well point systems.



A Vortex Portable Automatic Centrifugal Pumping Unit

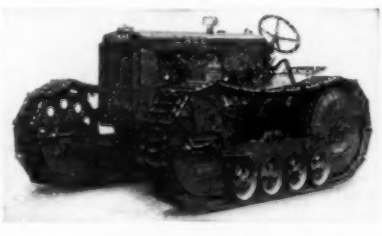
The automatic priming equipment consists of a positive-displacement vacuum pump, a vacuum control chamber, and an air-tight check valve on the centrifugal pump discharge. The vacuum control chamber regulates the vacuum in the centrifugal pump and suction pipe, and automatically opens a port to the atmosphere when the centrifugal pump is primed and pumping. When the automatic priming unit is started, the vacuum unit quickly exhausts the air from the suction line and the centrifugal pump, through the vacuum control chamber. As the air is exhausted, the liquid fills the intake line and the unit starts pumping. The vacuum control chamber prevents water from being drawn into the vacuum pump, and is of such design that its operation is not affected by gritty, dirty or muddy water. When air is drawn in through the suction line, the vacuum unit immediately starts exhausting it and as soon as enough water gathers around the suction hose to form a seal, the operation is resumed.

The units, which come in five sizes of 3, 4, 5, 6, and 8-inch suction and discharge respectively, are powered with 4-cylinder LeRoi engines in the four smaller sizes, and with a 4-cylinder Hercules engine in the 8-inch size. All engines are equipped with a hand throttle so that the speed of the engine can be regulated below the governor speed, which ranges from 1,400 in the 3-inch size to 1,000 rpm in the 8-inch size.

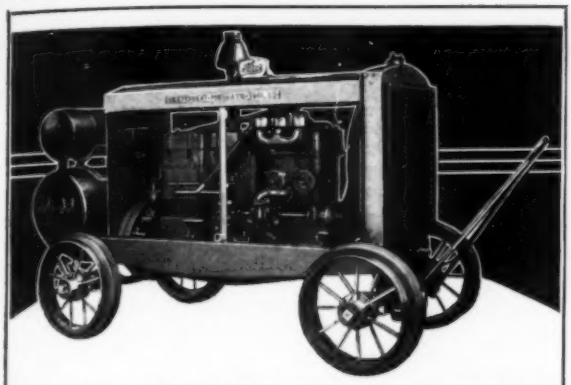
Heavy-Duty Crawlers for Industrial Tractors

A NEW heavy-duty crawler known as the Trackson Model GC has been announced for the Case industrial tractor by the Trackson Co., 1323 So. First St., Milwaukee, Wis. Equipped with this positive traction, the Case tractor is adapted to a wider range of uses. The combination permits not only drawbar work, but equipment operation as well. The design of the crawlers provides for the in-building of either front, side or rear-end equipment such as shovels, loaders, bulldozers, hoists, cranes, etc., and all are readily interchangeable.

Correct operation of any of these attachments is assured by the balance and structural strength of the combination. The motor unit does not overbalance the front end, but is centered fore and aft between the crawlers. Extra heavy crawler frames, truck wheels and bearings provide sufficient strength for the greater superimposed loads of equipment operation. Wide clearance between the crawlers and motor permits quick, secure attachment of the equipment and easy adjustment or lubrication of the crawler mechanism. The crawlers are of all steel construction with track shoes of heavy electric alloy steel, cast in one piece, and specially corrugated to grip securely without the possibility of causing damage to road surfaces.



The New GC Trackson-Case Crawler Unit



MORE AIR FOR YOUR MONEY

A size SMALLER THOR SIX actually does as much work as a size LARGER compressor of any other make. And you save the difference in cost. The THOR Compressor delivers 26 per cent more air, size for size, because it is the ONLY compressor equipped with a SUPER-CHARGER. Another money-saving feature is the direct-connected design—no troublesome clutch, couplings or gears. This eliminates vibration and reduces maintenance cost. Write for catalog No. 104.

INDEPENDENT PNEUMATIC TOOL CO.
248 S. Jefferson St. Chicago, Illinois

Thor "6" AIR COMPRESSOR

For Sale: A Bargain for Some City, County or Contractor

This complete asphalt paving plant, used only 6 weeks, for sale at 2/3 original price. Capacity 250 tons per day. First class condition. New machine guarantee. Fully portable. Oil Burners. Term payments if desired. Complete description on request.

Other products—Oil Burning Surface Heaters, Fire Wagons, Tar Kettles, Concrete Mixer Heaters, Kerosene Torches. Write for illustrated catalogs.

Chausse Oil Burner Company
Elkhart Indiana

Suitable Servicised Expansion Joints for every condition—

TYPE B

HOT — COLD — WET — DRY

WHAT are Servicised Expansion Joints?—They are premoulded safety strips which protect concrete roads and other concrete structures against cracking and self destruction due to temperature and moisture variations. They are produced from specially refined asphalts to which fibers are added for elasticity and reinforcement, after which they are formed hot under pressure into the required shapes.

WHY use Servicised Expansion Joints?—Because the initial expense is small, and the money saved by their use is considerable. Of what use is it to build a concrete road which will soon crack and require repairs? Servicised Joints are insurance against premature aging and cracking.

Two types are here illustrated: **Type "B"**—made of special quality asphalt and selected fibers, very low in moisture absorption, and with unusual conformity to expansion and contraction movements together with maximum control of oozing, and **our Reinforced Expansion Joint** developed for requirements demanding rigidity and strength in fillers, having a core of fiber heavily saturated with high-quality asphalt and reinforced on both sides by sheets of saturated felt.

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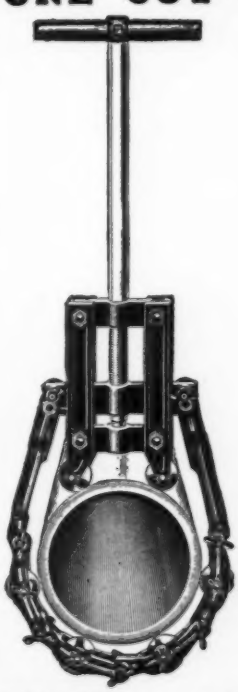
SERVICISED PRODUCTS CORPORATION
6051 W. 65th Street Chicago, Ill.

ONE CUT SAVES THE PRICE



YOU, too, may save the cost of this pipe cutter on one job, just as many other companies have done.

The ELLIS PIPE CUTTER

with its six keen rotary cutting blades eats its way right through any pipe in double - quick time. Use No. 01 for all kinds of pipe 4 to 8 inches in diameter, or No. 1 for pipe 4 to 12 inches in diameter.

Write for circular

ELLIS & FORD MFG. CO.
32 Piquette Ave. DETROIT, MICH.

The New Reo 4-Ton Truck

A New 4-Ton Heavy-Duty Truck

A NEW heavy-duty 4-ton 6-cylinder truck has recently been announced by the Reo Motor Car Co., Lansing, Mich. With a gross rated capacity of 20,000 pounds and a net capacity of 13,800 pounds, including body, cab and pay load, this is the largest unit in the Reo line of trucks.

This new line of Speedwagons is offered in three standard wheelbases, 150, 170 and 190 inches. The shortest wheelbase is for dump body or tractor service. The frame side channels are 10 inches deep and ¼-inch thick with a constant flange width of 3 inches. The front springs are 40 x 2 inches, and the rear, 50 x 2½, the latter being fitted with helper springs.

With a bore and stroke of 4⅛ x 4¾ inches and a displacement of 381 cubic inches, the 6-cylinder engine has a taxable horsepower of 40.8 and develops 101 horsepower at 2,600 rpm. The clutch is of the twin dry plate type, 11 inches in diameter. The low gear of the four-speed heavy-duty transmission combined with the 6.375 to 1 standard ratio of the spiral bevel full floating rear axle gives an overall low gear reduction of 41.58 to 1.

Among the body types furnished for these trucks are high and low side platform bodies with or without ridge poles, all types of dump bodies as well as special six-wheel equipment.

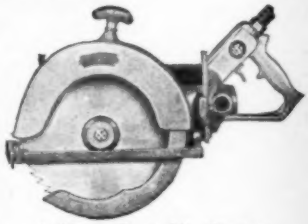
A New Trailer Air Compressor

THE Speed Trailer, a portable air compressor designed for high-speed towing, has recently been announced by the Ingersoll-Rand Co., 11 Broadway, New York City. It consists of a standard 5½ x 5-inch gasoline-engine-driven compressor mounted on two rubber-tired steel wheels. Because of the low center of gravity, it can be towed behind a truck on a good roadway at 30 to 35 miles per hour, according to the manufacturer. When detached, it can be moved by one man.

The steel frame forms a tool box 6 x 2 feet, providing ample room to carry all the tools and accessories ordinarily used with a compressor of this size. The complete Speed Trailer is 13 feet 10 inches long, 6 feet wide and 5 feet 9 inches high. It has a piston displacement of 120 cubic feet per minute and is designed for a working pressure of 100 pounds per square inch.

The New Speed Trailer Portable Compressor

A New Portable Electric Hand Saw



A U. S. Portable Electric Hand Saw

A LIGHT-WEIGHT portable electric hand saw, which is said to handle approximately 96 per cent of all sawing needed, including cross, rip, plane, rafter, bevel cutting, pocket cutting on stone, slate and other materials, and which has ample power to saw the hardest wood, wet or dry, has been announced by the United States Electrical Tool Co., Dept. 95, 2490 West 6th St., Cincinnati, Ohio. Only two adjustments are necessary to set the saw instantly for any depth and for any angle up through 60 degrees. A patented beveling device does away with the need for a try-square. A clear vision blower keeps the sawdust away from the markings, assuring even sawing. Top and automatic bottom guards protect the operator in every working position.

Ball bearings are used throughout in all models. A special new type heat-treated double-reduction gear assures long life and maximum power from the motor. The new saw is made for depths of 1⅞, 2⅝, 3 1/16, 3 9/16 and 4⅛ inches. It weighs but 26¼ pounds and is said to be fast enough to keep eight to ten men busy.

A New Light Haulage Gasoline Locomotive

TO meet the requirements of those having a light haulage problem, a new model gasoline locomotive equipped with a Ford engine and 4-speed truck transmission has been announced by the Plymouth Locomotive Works of the Fate-Root-Heath Co., Plymouth, Ohio. This locomotive is built in 2½, 3, 3½ and 4-ton sizes on a short wheel base so as to be able to readily negotiate sharp curves. It has plenty of power making it a unit suitable for contractors, quarries, sand, gravel and clay plants and general industrial haulage.

A Plymouth reversing mechanism connected by a shaft and universal joints to the Ford 4-speed truck transmission, provides four speeds in either direction. The side frames, bumpers, and cross supports are of heavy structural and bar steel, well braced and rigidly riveted and welded together.

The New Ford-Engine-Powered Locomotive

WOOD hoist *holds* body at any dumping angle!

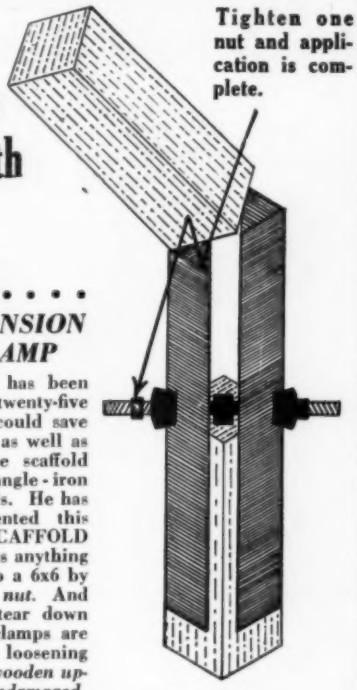
A Wood hoist and body installation is pictured, spreading top dressing. A ball-check pump holds the body at any desired angle, while the truck is in motion. The tailgate spreading device allows even material distribution. Smooth floor permits clean discharge. And all-steel construction gives long life. *All Wood equipment sold under life time guarantee. Write for literature.*

WOOD HYDRAULIC HOIST & BODY CO.
DETROIT, MICH.

WOOD HOISTS & BODIES

Branches, Distributors in Principal Cities

22 Times faster than splicing with wood by actual test . . . .



Tighten one nut and application is complete.

The New EXPANSION SCAFFOLD CLAMP

A contractor who has been building scaffolds for twenty-five years found that he could save a great deal of time, as well as avoid damage to the scaffold timbers, by using angle-iron clamps instead of nails. He has developed and patented this EXPANSION SCAFFOLD CLAMP, which splices anything from a 3x3 upright to a 6x6 by simply *tightening one nut.* And when it is time to tear down the scaffolding, the clamps are easily removed by loosening one nut, *leaving the wooden uprights clean and undamaged. Let us send you our illustrated circular.*

Agents Wanted

EXPANSION SCAFFOLD CLAMP CO.
36-40 BOWNE STREET FLUSHING, N. Y.

LAUSON

LA-815
1¼-1½-hp.
Air-Cooled
MANUFACTURERS JOBBERS—DEALERS

This Lauson 4-cycle General Purpose Motor is also furnished in the water-cooled type equipped for circulating water, radiator or tank cooler.

There are 8 sizes of General Purpose Motors from ¼ to 1½-hp. Also other Lauson Vertical Engines, from 1½ to 3-hp.; and Horizontal Engines from 1½ to 18-hp. Write for details on the complete Lauson Line.

THE LAUSON CORPORATION 100 Ogden Avenue New Holstein, Wis.

HONHORST TAR HEATERS

"Built for service"

ALL STYLES
Portable and Stationary
25 to 200 gallons

See our page in Street Construction Section, Municipal Index, for the Kettle you need.

Write for Pamphlet No. 15 on the New Oil Burning Heater

THE JOS. HONHORST CO.
1016 W. 6TH ST. CINCINNATI, O.

CONTRACTORS—we present the HanDeeBox, a tool box made to stand the terrific abuse given equipment in highway service.

It is of All-Steel Construction—much stronger than a wooden box, but lighter in weight. Keeping tools in this box is like putting them in a SAFE!

Let us tell you all about the HanDeeBox. Write for Bulletin No. G-6.

LITTLEFORD
Road Maintenance Equipment
SINCE 1900
LITTLEFORD BROS. 185 E. PEARL ST. CINCINNATI, O.

Self-Contained Portable Electric Plants

A U. S. Model LB Portable Electric Plant

COMPLETELY self-contained electric lighting and power plants of 350 and 750 watts are manufactured by the United States Motors Corp., 131 Nebraska St., Oshkosh, Wis. These Model LB plants are simple in construction and operation, supplying 110-volt direct current, and are therefore suitable for all standard direct current lamps or appliances and for the operation of direct current or universal type electric motors. The 350-watt plant will light fourteen 25-watt lamps or the equivalent and operate up to ¼-horsepower electric motors. The 750-watt plant will light up to thirty 25-watt lamps or the equivalent and will operate up to ¾-horsepower motors.

The entire plant is sturdy in construction, to meet the requirements of heavy and continuous service. A push on the starting lever, either with the hand or foot, instantly starts the plant and immediately supplies the current for lighting or power purposes. The generator is mounted on the engine and is driven by a special composition V-belt. The general construction of the 350-watt and the 750-watt models is identical, the only difference being in the size of the generator and the horsepower of the engine, which on both models is of the single-cylinder, air-cooled four-cycle L-head type. On the 350-watt plant the engine is of 2¼-inch bore by 2¼-inch stroke, developing ¾ horsepower and on the 750-watt plant it is of 2½-inch bore by 2½-inch stroke, developing 1½ horsepower. The plants are equipped with positive high tension Wico flywheel type magnetos, both dust and moisture-proof, positive flyball type governors, located in the crankcase constantly in a spray of oil and a carburetor of the float feed type. Lubrication is by the splash system under vacuum control.

The 350-watt Model LB plant weighs 99 pounds, is 16 inches long, 16 inches wide and 20¾ inches high. Under full load this plant will operate about 10 hours on one gallon of gasoline. The larger model weighs 135 pounds, is 18 inches long, 17 inches wide, 24 inches high and will operate about 5 hours on a gallon of gasoline.

The New Diesel Tractor for Contractors

TO produce a diesel engine which will operate under widely varying conditions and always in the midst of dust and dirt was the problem faced by the Caterpillar Tractor Co., Peoria, Ill., when it started to develop its new line of diesel-powered Caterpillar tractors. The outstanding contribution in this new engine is the complete removal of all field adjustments and timing features from the fuel injection apparatus. By specially designed instruments and machines the fuel injection apparatus is adjusted, regulated, and timed in the factory. The assembled units are then sealed and are replaceable in Caterpillar diesels. A complete set of spare fuel injection apparatus accompanies each diesel engine so that replacement can be made in the event of any difficulty with the originally installed apparatus without the necessity of the delicate work of timing, adjusting or regulating.

Caterpillar has set for itself a new standard for diesel engines in the complete inclosure and dustproofing of the vital operating parts. This has been accomplished without minimizing accessibility and without endangering lubrication by contamination from fuel system leakage. The same simple operating control is provided as used on gasoline tractor engines. There is also included a variable speed governor control which provides acceleration and flexibility even surpassing gasoline tractor practice, according to Caterpillar's report.

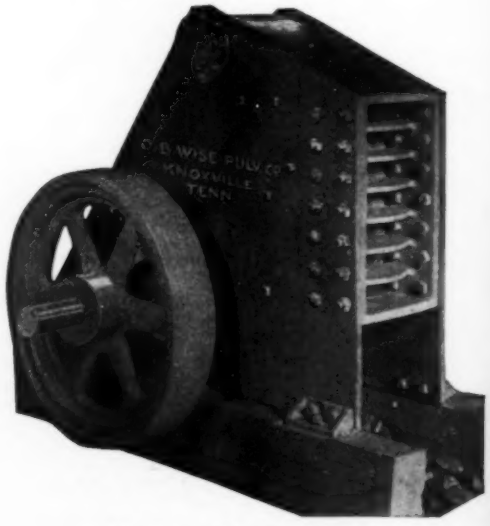
The chief problem which was faced by the Caterpillar Tractor Co. in its new diesel was to develop a fuel injection apparatus so coordinated with the combustion process that it would operate entirely successfully. The engine is designed to maintain its rated full load over extended periods of operation, to preserve combustion efficiency and maintain balanced firing at light loads and to provide variable load with satisfactory combustion quality, to provide smooth operation over the entire operating range by eliminating combustion roughness and detonation, to reduce maintenance cost to a minimum by extending the life of exhaust valves, cylinders, pistons and bearings and to provide simple operating controls.

Crushers and Pulverizers for Tractor Power

A LINE of crushers and pulverizers designed and built for tractor operation, is made by O. B. Wise Pulverizer Co., Knoxville, Tenn. These machines are made of high-grade materials, are simple and durable in construction and can be operated easily and efficiently by a McCormick-Deering 10-20 tractor.

The crushers are made in three sizes. The cast iron crusher has a jaw opening of 7 x 12 inches, weighs 3,000 pounds and has a capacity of 50 to 75 tons per day. The steel crusher which has a jaw opening of 7½ x 14 inches has a capacity of 75 to 100 tons per day and weighs 5,500 pounds. The largest crusher is also made of steel and has a jaw opening of 9 x 15 inches. This unit has a capacity of 100 to 130 tons per day and weighs 6,000 pounds.

Pulverizers are made in several sizes to suit various power requirements. Elevators and all-steel trucks can be supplied with any size of pulverizer, as well as mesh screens of different sizes for special gradings.

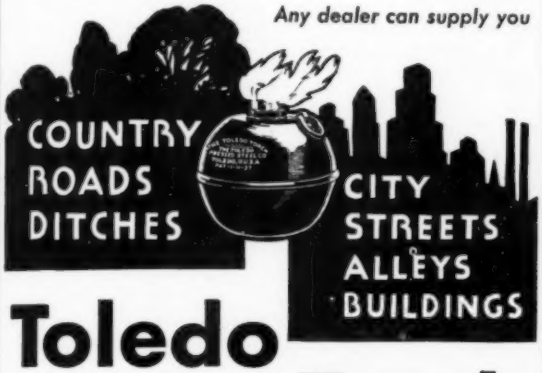


The O. B. Wise Rock Crusher

Whenever You Need Safety Lights

—use *Toledoes!* They defy weather, protect workmen, decrease liability—at a cost 50% less than usual.

Any dealer can supply you



Toledo Torch

The Toledo Pressed Steel Co.
TOLEDO OHIO

Save with Steel

Manufacturers of The Toledo Horse—the ideal highway barricade

D-A LUBRICANT

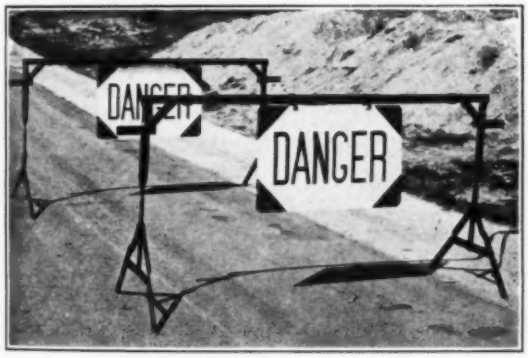
10 Years Service to Contractors "Always Uniform"

THE Semi-Fluid Lubricant for TRACTORS, TRUCKS, CRANES, SHOVELS and OTHER HEAVY DUTY EQUIPMENT.

"D-A" protects gears and bearings, prevents friction and wear and tear, reduces repair and replacement expense and keeps your equipment on the job through heat, mud, water, dust or grit. In addition to this great saving in your maintenance costs, D-A actually costs less to use, for it lasts many times longer than ordinary greases.

D-A LUBRICANT CO., INC.
INDIANAPOLIS, IND., U. S. A.

Order from Your Dealer, Our Salesmen or Direct from Factory. Immediate Delivery.



Above: McCurdy Road Guard in Use
At the right: Collapsed for moving to the next job

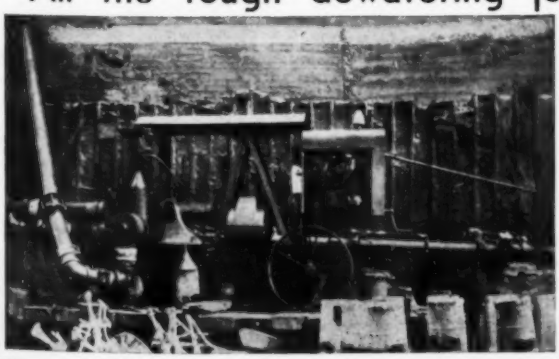
McCurdy Road Guards

All—Steel—Adjustable—Collapsible

It's a quick and easy matter to close a street to traffic while repairs are going on, if you own a pair of McCurdy Road Guards. They are easy to transport to the job—simply carry them collapsed on your running board. You can set one of these guards up in one minute—and take it down and collapse it in one minute when the job is finished. Being made of all-steel, a McCurdy Road Guard will stand all kinds of hard knocks and won't break or wear out in many long years. It's considered everywhere the most efficient and economical road guard obtainable for street repair work. Price $5.80 each. Write for our illustrated circular.

McCurdy Steel Products Company
Ada, Ohio

All the tough dewatering jobs are MORETRENCH jobs!



MORETRENCH MEANS THIS:

Moretrench Wellpoint—270 inches of useful filter intake—thirty times as much as the ordinary point!

Moretrench Header Pipe—coupled with Moretrench Quick-couplings—goes together in one-tenth the time!

Moretrench Combination Pump—a self-priming centrifugal with a Moretrench vacuum pump,—8-inch bronze cylinder —4-inch stroke—lifts thirty feet—giving a high continuous vacuum.

MORETRENCH KNOW HOW—makes *every job a dry job.*

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MORETRENCH CORPORATION

Works ROCKAWAY, N. J.

Sales Offices 90 West Street, N. Y.

USE THIS SERVICE — IT'S FREE

These especially selected catalogs and pamphlets of value to contractors are for free distribution. You will find it worth while to check these lists each month and write for the catalogs you need.

Asphalt Equipment for Contractors

313 Illustrated catalogs describing the complete line of Chausse oil burning surface heaters, tar kettles, portable asphalt plants and repair units may be secured by interested contractors from the Chausse Oil Burner Co., 1227 W. Beardsley Ave., Elkhart, Ind.

A One-Man Automatic Tractor Scraper

314 Gustav Schaefer Co., 4180 Lorain Ave., Cleveland, Ohio, will be glad to send to those interested its circulars describing the Schaefer one-man automatic tractor scraper which is economical, handy and easy to run and is made in four sizes with scraper widths of 4, 5, 6, and 7 feet.

Quick-as-Wink Hose Couplings

315 Quick-as-Wink hose couplings which only need to be pushed together to be locked tightly against either air or water leakage and which permit free swiveling so that hose kinks are eliminated are described completely in a folder issued by C. B. Hunt & Son, Salem, Ohio.

An Effective Hand Pulling Device

316 Folders Number 101 and 102 describe the large Puljack and Puljack, Jr., made by the Puljack Mfg. Corp., 98 Pine St., New York City, for moving heavy equipment, spotting and re-railing cars, pulling stumps and trees, wrecking and demolition. This device-weighing 46 pounds and 198 pounds respectively, is quickly set up and operated by one man.

A Speedy Splicing Clamp for Scaffold Uprights

317 The Expansion Scaffold Clamp Co., 36-40 Bowne St., Flushing, N. Y., will be glad to send its illustrated circular showing practical timber clamps which make splicing possible 22 times faster than by the use of wood nailed to the timbers. The clamps may be used over and over and the wood is not damaged.

Reduction Crushers

318 Bulletin No. 1110 published by the Traylor Engineering & Mfg. Co., Allentown, Pa., describes the Traylor Type TZ reduction crusher which has large capacities for relatively small power expenditure and maintenance cost, large receiving opening and reduction ratio, small uniformly sized products with low percentage of oversize, wide range of adjustment for product size and adaptability to service in any material.

Expansion Joints for Every Temperature Condition

319 Catalog No. 11 describing Servicised expansion joints which are suitable for every temperature and moisture variation and which are designed to preserve the tightness, alignment, and permanency of any monolithic concrete structure may be secured on request from the Servicised Products Corp., 53 W. Jackson Blvd., Chicago, Ill.

An 11-Foot Tractor Shovel

320 The new Austin Badger, an 11-foot tractor shovel powered with a McCormick-Deering Model 20 industrial unit and which has a ¼-yard swing and an exceptionally high lift is completely described in Bulletin 1236 which may be secured from the Austin-Western Road Machinery Co., 400 N. Michigan Ave., Chicago, Ill.

A Cylindrical Concrete Bucket

321 The Wiley concrete bucket which is a riveted cylindrical unit with a tapered bottom and radial gate control is completely described and depicted in literature which may be secured from the Dayton Whirley Co., Dayton, Ohio.

A New 1½ to 2-Ton Truck with 6-Cylinder Engine

322 General Motors Truck Company, Pontiac, Mich., will be pleased to furnish to any contractors interested a description of its new 1½ to 2-ton truck powered with a 6-cylinder 60-horsepower engine and built in 131 and 157-inch wheelbases.

The Largest Portable Air Compressor

323 Bulletin No. 3106 describing the new 540-cubic foot displacement unit, consisting of an 8 x 6-inch four-cylinder compressor driven by either a gasoline or a diesel heavy-duty Buda engine and claimed to be the largest multi-cylinder portable air compressor, may be secured by those interested from Schramm, Inc., West Chester, Penna.

A New Heavy-Duty Hoist for Dump Bodies

324 A new power-operated hydraulic hoist for heavy-duty service on 1½-ton chassis has been placed on the market by the Wood Hydraulic Hoist & Body Co., Detroit, Mich. A complete description of this may be secured direct from the manufacturer.

Three Models of Tractor-Mounted Hoists

325 The Bear Cat Hoist which is made in three models available for McCormick-Deering tractors and covering a range of hoisting requirements for light, medium and heavy loads, is made by the Shaffer Specialty Co., 2440 E. Kind St., Tulsa, Okla., who will gladly send complete details and specifications on request.

A New Portable 2-Inch Centrifugal Pump

326 The new Deming Mueller 2-inch portable centrifugal pumping unit which weighs only 165 pounds and handles 120 gallons of water per minute against a head of 20 feet is completely described in a circular which may be secured direct from the Deming Co., Salem, Ohio.

A Truck-Mounted Arc Welder

327 The Hansen arc welder made by the Northwestern Mfg. Co., Milwaukee, Wis., for mounting in a light motor truck and which is driven by the same engine as drives the truck is described completely in literature which the manufacturer will be glad to send on request.

Seven to Eight-Yard Bottom-Dump Wagon

328 Complete information regarding the LaPlant-Choate DW-7 and DW-73 bottom-dump crawler wagons of 7 to 8-yard capacity with both hand wind and hydraulic door wind may be secured direct from the LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa.

Gasoline and Electric Hoists

329 Dake Type S-LG hoists which combine strength, efficiency and light weight and which have ample, reliable power units and every convenience for safe operation, are described in Bulletin 32 which the Dake Engine Co., Grand Haven, Mich., will be glad to send on request.

Lighting Your Night Work

330 The National Carbide V-G light which gives daylight conditions on night jobs, spreads a full even beam of about 8,000 candlepower and lights up the work for about nine hours on one 5-pound charge of National 14-ND carbide and 5 gallons of water is described in literature which those interested may secure from the National Carbide Sales Corp., Lincoln Bldg., New York City.

Water Supply and Dewatering Pumps

331 Domestic Engine & Pump Co., Shippensburg, Penna., will be glad to send to those interested complete information in regard to its water supply pumps, of the simplex, duplex, triplex and sextuple types with capacities from 20 to 300 gpm, for the road builder and its dewatering pumps, of the diaphragm, plunger and automatic-priming centrifugal type with capacities from 80 to 2,000 gpm, for excavating, sewer, pipe line and bridge contractors.

Heavy-Duty Crawlers for Industrial Tractors

332 A new heavy-duty Trackson crawler known as Model GC has been announced by the Trackson Co., 1323 So. First St., Milwaukee, Wis., for use with the Case industrial tractor. A complete description may be secured direct from the manufacturer.

(Cut or tear along this line)

CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Avenue, New York

Gentlemen: Please send me the following literature, without cost or obligation.

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(Indicate by numbers)

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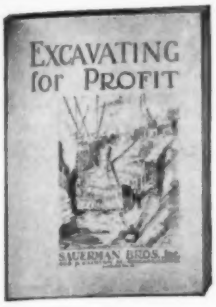

This Book Tells How to Save Money on Excavating Work

It is really a handbook on the slackline cableway method of digging and conveying materials. Clearly illustrates and describes how to simplify difficult excavating work. Your free copy of this book awaits your request. Just say: "Send Catalog No. 12."

SAUERMAN BROS., Inc. 464 So. Clinton St. Chicago, Ill.

PORTABLE OR STATIONARY
AIR COMPRESSORS
Any mounting for Any Job

REPRESENTATIVES IN EVERY IMPORTANT CITY

Schramm

WEST CHESTER, PENNSYLVANIA

Having four types . . . Orange Peel, Clam Shell, Electric Motor, and Drag Line . . . of digging and rehandling buckets to draw from, makes a Hayward recommendation absolutely unbiased.

THE HAYWARD CO.
32-36 Dey St. New York, N. Y.

Hayward Buckets

GENUINE
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FOR BETTER CONCRETE

IT WATERPROOFS
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IT STRENGTHENS
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Acqua-Pruf is a liquid integral for cement and concrete, One quart to the bag produces a compressive strength 25 per cent in excess of untreated concrete.

Acqua-Pruf treated concrete can be poured at temperatures as low as 10 degrees above zero.

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786 BROAD ST. Tel. MArket 3-2739 NEWARK, N. J.

TRUSCON STEEL LINER PLATES

For tunnels, caissons, shafts, sewers and other permanent underground construction. Low cost, safety and speed are features. Write for data.

TRUSCON STEEL COMPANY
6100 TRUSCON AVENUE, CLEVELAND, OHIO

MARION MULES

The oscillating front axle on Marion Mules permits an even haul over uneven roads, excavations, or fills. The angle of oscillation causes either front wheel to operate perfectly within a 21-inch verticle movement. . . . Rubber tires can be furnished as regular equipment as well as steel wheels or crawlers. . . . Complete information and prices will be mailed upon request.

MARION MULES INC.
MARION, OHIO

Magnetos for Trucks and Tractors

333 Road contractors will be particularly interested in literature describing the Apollo high tension magneto and Jumbo attachments for installing them on Ford trucks and Fordson tractors, which The Apollo Magneto Corp., Kingston, N. Y., will be glad to send on request.

Air Springs for Heavy Trucks

334 Complete information in regard to Cleco Gruss air springs for road cushioning for trucks which are designed to absorb the destructive strains and reduce truck maintenance expense may be secured by interested contractors from the Cleveland Pneumatic Tool Co., Cleveland, Ohio.

New Crawler Tracks for Industrial Tractors

335 Literature describing the new Peerless crawler tracks for use on Fordson industrial tractors, which are designed to give positive traction on soft ground, gravel, sand or snow, are substantially built and easily attached to the tractor with the use of ordinary tools and without altering the tractor except to remove the wheels, may be secured by those interested from the Peerless Track Co., St. Joseph, Mich.

Automatic-Priming Centrifugal Pumps

336 Complete information in regard to the new line of Vortex automatic-priming centrifugal pumps for dewatering excavations, quarry pumping, drainage, well point systems and work of a similar nature may be secured by interested contractors from the Lawrence Pump & Engine Co., P. O. Box 70, Lawrence, Mass.

An Automatic Scale for Weighing Bulk Cement

337 The Richardson Duo-Screw Feed automatic scale which is designed to weigh loose or bulk cement automatically and accurately, direct from a properly designed and constructed storage bin, from which all cement for weighing will flow freely is described in literature which the Richardson Scale Co., Clifton, N. J., will be glad to send on request.

A New Heavy-Duty Grader

338 Literature describing the new Wehr grader which is massive in construction and is particularly designed for those requiring a large high-speed machine, capable of producing finished work on all types of roads, will be sent on request by the Wehr Co., Cudahy, Wis.

A Portable Steel Powder Storage Magazine

339 Portable steel powder magazine No. 82 made of 14-gage copper-bearing steel with complete ventilation and which is strong, easy to erect and has interchangeable parts is described in a circular which may be secured direct from Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio.

Digging and Rehandling Buckets

340 Hayward Co., 32-36 Dey St., New York City, will be glad to send to interested contractors complete information in regard to its complete line of digging and rehandling buckets in four types, orange peel, clamshell, electric motor and dragline.

Road Rollers for Hard Continuous Service

341 Literature describing the Hercules line of road rollers, built in sizes from 6 to 15 tons, and designed for hard continuous service will be sent on request to interested contractors by the Hercules Co., Marion, Ohio.

A Complete Line of Asphalt Equipment

342 Chas. Hvass & Co., Inc., 508 East 19th St., New York City, will be glad to send to those interested complete information in regard to Hvass bituminous distributors, heavy-duty trailers, sand and chip spreaders and heating kettles for bituminous road construction and repair.

Crown Data for Roads and Streets

343 Cleveland Formgrader Co., West 116th St. & Nickel Plate R. R., Cleveland, Ohio, manufacturer of Cleveland formgraders, subgrade scrapers and aluminum straight-edges, has recently published a booklet tabulating data to give ordinates for various crowns at 1-foot intervals across the slab as well as the quarter points. The price of this booklet is $1.00.

A Locomotive-Type 2½-Ton Crane

344 The Silent Hoist Winch & Crane Co., 762 Henry St., Brooklyn, N. Y. has developed the Krane Kar, a locomotive-type crane for moderate capacity intended for use in storage yards, by public utility corporations, water supply and other municipal departments and highway and subway contractors. A complete description may be secured direct from the company.

An Oil, Tar and Asphalt Distributor

345 E. D. Etnyre & Co., Oregon, Ill., will be glad to send to those interested a copy of Bulletin 503 containing specifications and interesting facts in regard to the Model F oil, tar and asphalt distributor for building and maintaining bituminous roads.

Dependable Power for Construction Equipment

346 Complete information in regard to Le Roi engines which are made in sizes ranging from 3 to 180 horsepower and are designed to furnish dependable power for construction equipment may be secured from the Le Roi Co., Milwaukee, Wis.

A New Light Drill-Sharpening Machine

347 The advantages of power sharpening of drill steel are now made available to contractors and municipal departments whose small use of steel has not warranted the installation of a large machine. The Class E Sullivan sharpener is described in a new Bulletin 72-P which will be sent to any contractor or municipal engineer upon application to the Sullivan Machinery Co., 814 Wrigley Bldg., Chicago, Ill.

A Small Full-Swing Crane

348 Details regarding the Manly Full-Swing crane, which is adaptable to utility work of all kinds such as digging manholes, excavation work, setting up transformers and light poles, laying water mains, gas pipes and sewer pipes, backfilling and handling heavy timber such as bracing in vaults and congested places where space is limited, is available on request from the Western Machine Works, 1312 West 22nd St., Chicago, Ill.

Pumps and Compressed Air Equipment for Contractors

349 Worthington Pump & Machinery Corp., Harrison, N. J., will be glad to send to those interested complete information in regard to its line of Worthington pumps, rock drilling equipment, contractors' air tools, drill steel and accessories as well as the recently acquired line of Metal-weld-Worthington portable air compressors.

Steel Hand Hoists for Contractors

350 Descriptive literature on the line of Beebe all-steel hand hoists which have a straightline capacity of 5 tons, with a positive internal brake and weigh 110 pounds, may be secured by interested contractors from Beebe Bros., 3219 First Ave., So., Seattle, Wash.

Blocks for Manila or Wire Rope

351 Anvil Brand blocks for manila or wire rope in all standard sizes and styles and which are designed for strength, service and safety, are described in Catalog C. E. which the Western Block Co., Lockport, N. Y., will be glad to send on request.

Faster Concrete Curing

352 The use of calcium chloride to increase the speed of setting of concrete, to give greater early strength, to permit faster and therefore more economical operation and, in winter construction, to lessen the danger of freezing is described in literature which may be secured on request from the Columbia Alkali Corp., Barberton, Ohio; Solvay Sales Corp., 61 Broadway, New York City, or the Dow Chemical Co., Midland, Mich.

Complete Asphalt Plants

353 Simplicity System Co., Chattanooga, Tenn., will be glad to send to interested contractors complete information in regard to Simplicity asphalt plants which are simple in construction and dependable in operation.

A Way to Save Money on Your Next Wet Job

354 This is the title of a booklet describing the use of Humdinger self-priming centrifugal pumps ranging from 2 to 8 inches in size with capacities up to 2,000 gpm. Copies of this booklet may be secured by those interested from the Ralph B. Carter Co., 190 Atlantic St., Hackensack, N. J.

Corrosion-Resistant Corrugated Culverts

355 Complete information in regard to Gohi corrugated culverts which are made of pure iron-copper alloy to meet the copper-bearing pure iron requirements in all accepted specifications for corrugated metal culverts and which are designed to resist the corrosive influences of soil, water and weather may be secured by those interested from the Gohi Culvert Manufacturers, Inc., Newport, Ky.

General Purpose Motors

356 Lauson Corp., 100 Ogden Ave., New Holstein, Wis., will be glad to send to those interested complete details in regard to Lauson general purpose motors which are made in eight sizes ranging from ½ to 1½ horsepower, as well as the other Lauson vertical engines, from 1½ to 3 horsepower and the horizontal engines from 1½ to 18 horsepower which make up the complete Lauson line.

An Accelerator for Concrete

357 Complete information in regard to Acqua-Pruf, a liquid integral for cement and concrete which waterproofs, quick-sets, strengthens and acts as an anti-freeze for concrete, may be secured by those interested from Acqua-Pruf, Inc., 786 Broad St., Newark, N. J.

Self-Contained Portable Electric Plants

358 Model LB completely self-contained electric lighting and power plants of 350 and 750 watts which are simple in construction and operation, supplying 110-volt direct current, are manufactured by the United States Motors Corp., 131 Nebraska St., Oshkosh, Wis., who will be glad to send literature on request.

All-Steel Adjustable Road Guards

359 An illustrated circular describing McCurdy all-steel road guards which are adjustable and collapsible, which require one minute to set up or collapse and which can readily be transported from one job to the next may be secured by those interested from the McCurdy Steel Products Co., Ada, Ohio.

Marine Construction Equipment

360 Bulletin No. 41 recently issued by the McKiernan-Terry Corp., 19 Park Row, New York City, completely describes Lambert-National marine equipment including gasoline, electric and steam hoists, steel derricks, whirlers and dredge hoists.

Tracks for Axle-Driven Tractors

361 Literature describing Moon tracks for all axle-driven tractors to provide positive traction, lower power costs and longer tractor life may be secured by interested contractors from the Moon Track Co., 1822 McCormick Bldg., Chicago, Ill.

Hydraulic Hoists and Dump Bodies

362 St.Paul hydraulic underbody hoists for 1½ to 5-ton trucks as well as St.Paul steel dump bodies in a variety of types and sizes are described in an unusually attractive and well-illustrated folder which the St.Paul Hydraulic Hoist Co., St. Paul, Minn., will be glad to send on request.

Fall and Winter Highway Work

363 Literature describing the use of Tarmac for resurfacing, seal coating or maintaining roads and streets during the fall and winter with a minimum expense for materials and equipment may be secured by those interested from the Koppers Products Co., Koppers Bldg., Pittsburgh, Penna.

Bituminous Heaters and Distributors

364 Kinney heaters and distributors, for both tar and asphalt, which are made in a variety of styles and sizes to suit the various requirements of contractors and highway officials are described in literature which the Kinney Manufacturing Co., 3541 Washington St., Boston, Mass. will be glad to send on request.